THE LEATHER WORKER'S MANUAL

BEING A COMPENDIUM OF

PRACTICAL RECIPES AND WORKING FORMULÆ
FOR CURRIERS, BOOTMAKERS, LEATHER
DRESSERS, BLACKING MANUFACTURERS,
SADDLERS, AND FANCY LEATHER
WORKERS

BY

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AUTHOR OF "SEALING WAXES AND OTHER ADHESIVES," ETC.

THIRD EDITION REVISED

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PREFACE TO THIRD EDITION.

As stated in the preface to the first edition, it is not intended in the following pages to teach tanners and curriers the art of leather manufacture, as data on the technique of these sections of the industry is best sought for in recognised books, and in the excellent technical journals now on the market. The original idea of the book was to impart in a convenient form the methods of preparing and using the various preparations used in leather manufacture, such as seasons, dyes, blackings, finishes, polishing and renovating compounds, the formulæ of which are often difficult to obtain at short notice. The idea of publishing formulæ and recipes was suggested to the late Mr. H. C. Standage by the constant enquiries he received from curriers and others, and judging by the ready and constant sale his book has had, it is evident it has proved useful to thousands of traders interested in leather in its various forms.

Few people realise how specialised the leather industry has become during the past generation, so that at the present time each variety of leather is now manufactured by a specially trained class of operative, whilst so great has the improvement been in the quality and variety of manufacture, that few men have now either the time or inclination to work out recipes and formulæ for the various purposes, and often prefer to buy seasonings, finishes, etc., ready made. At the same time, there are still plenty of smaller manufacturers who prefer to make up their own preparations, and it is for this class, more especially, the attempt has been made to bring this work up to date.

Since the original work was published, the art of making leather by what is popularly known as the chrome process has made great strides, and although this is far too scientific and technical to fully deal with in a book of this class, yet an attempt has been made to give an intelligent outline of this branch of tanning and to give valuable formulæ for the preparation of chrome liquor, in a special chapter.

Other special features included in this revised edition are notes on British made dye-stuffs, the preparation of sulphonated or soluble oils, and soaps suitable for leather users, etc. It is perhaps necessary to add that whilst it has been thought advisable to delete some of the older methods and recipes, yet in cases where a certain amount of merit and utility seemed evident, a few recipes have been again given which are not in use at the present time, but which, with slight alterations, might again prove useful, as it was known the late Mr. H. C. Standage had collected his data from practical sources. Obviously, it was not in the power of those responsible for this revised edition to test the various formulæ on a practical scale.

In actual practice, it is often necessary to alter or modify a formula or recipe to suit individual conditions and requirements, and for this reason it is always advisable to work out the recipe or formula on a small scale, and to make minor alterations from time to time until the desired result is obtained.

Whatever faults this work may have, it is probably the only one of its class in existence, and as every section of the trade is catered for, the publishers feel in bringing out this revised edition, it will prove a valuable addition to the practical literature of the leather industry, and to the numerous sections which are indirectly connected with it.

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CONTENTS.

CHAPTER I.

PAGE

BOOT AND SHOE BLACKINGS, POLISHES, GLOSSES, DRESSINGS, RENOVATORS 1

Boot Blackings—Common Boot Blackings—Paste Blacking—Fluid Blackings—Gutta-Percha Blacking—Superior Blacking Compounds and Dressings for Patent Leathers—A Special Liquid Blacking for High-Class Boot Leathers—Gloss for Glacé Leathers—Blacking that Restores the Surface of Leather—Self-Shining Blacking—Emollient Compounds—Compound for Bag and Belt Leather—An Expensive but Good Quality Dressing—Dressing for Soft, Dull Calf Kid and Kip Leathers—A Waterproof Dubbin—Another Good Waterproof Dressing—Fluid Gloss for Glacé Leathers—A Third Liquid Dressing for Boot and Shoe Leathers—A Liquid Dressing for all Kinds of Light Leathers—Reviver for Patent Leathers—Alkaline Renovator for Patent Leather—Spirit Renovator for Patent Leather—Paste Renovator for Patent Leathers—Wax Polish for Patent Leathers—Simple Wax Polish for Brown Leather—General Formula for Creams—A Brown Cream—A Cheap Brown Cream—Tan Paste for Softening and Polishing Brown Leathers—Gloss for Brown Patent Leather—A Waterproof Gloss for Brown Leather—Dubbin for Russia Leather—Treeing Compositions—To Renovate Calf Kid Uppers—Renovating Dressing for Glacé Kid Leather, and for Brown Glacé Leather—Bronze Lacquer—Crimson Purple Bronze—Wax Polish for Bronze Leather Bags, Portmanteaus.

CHAPTER II.

HARNESS POLISHES, BLACKINGS, DRESSINGS, COMPOSITIONS, GREASES, SOAPS, BOOT-TOP POWDERS AND LIQUIDS 29

Coachmen's Boot-Top Powder—Pink or Flesh-Coloured Boot-Top Powder—Nut-Brown Boot-Top Powder—Boot-Top Liquids—Brown Boot-Top Liquid—Waterproof Boot Grease—Renovators for Treeing Boots—To Whiten Military Boots, Belts, and Breeches—Renovator for Buff Leather Riding Breeches—Waterproof Harness Polish—Harness Lacquer for Black Harness—Dressing for Carriage Tops—White Lacquer for White Enamelled Leather—Lacquer for Varnishes for Enamelled Leather Carriage Tops—Elastic Varnish—A Self-Shining Lacquer for Enamelled Harness—A Polish for Black Harness—A Harness Oil for Black Harness—A Liquid Blacking for Harness—A Waterproof Liquid Blacking—A Liquid Dye for Black Harness that is Worn—Harness Paste—A Superior Waterproof Harness Paste—A Good Harness Oil—A Simpler Harness Composition—A Superior Quality Ball Black—A Good Harness Dressing—Black Harness Renovator—A Cheap Harness Oil—Vaseline Harness Composition—Harness Oil for General Use—Harness Grease.

CHAPTER III.

PAGE
LEATHER GRINDERS' SUNDRIES . . . 45

Heel Balls—Bottom Washes or Finishes for Soles, Waists, etc.—Buff Finish for Soles and Wastes of Boots and Shoes—A Cream Finish for Sole Leather, Boot Tops, etc.—Cream White Sole Finish—A Very White Bottom Wash—A Waterproof Wax Finish for Sole Leather—Boot Powders for Tight Boots, Spankum, etc.—Solution Wax—Shoemaker's Waxes—Finisher's Ink—Staining Inks—A Brown Finishing Ink—Burnishing Ink—Finishing Inks—Spirit Black Dressing or Ink—Shellac Ink—Waxes for Sewing Soles—Wax for Sewing Machines—White Wax for Waxing Hemp Sewing Threads—Dubbin—Edge Stains—Orange Stain—Red Stain—Crimson Stain—Brown-yellow Stain—Glue Pastes for Skins—Waterproof Compound—Waterproof Cement for Bootmakers—Shoemaker's Paste—Shoemaker's Paste for Stiffeners—Composition for Sole Leathers—Bleaching Compound for Tanned Leathers.

CHAPTER IV.

CURRIERS' SEASONINGS, BLACKING COMPOUNDS, DRESSING FINISHES, GLOSSES, ETC. 62

Introduction, Compound for Stuffing Kips—Waxed Calf—Stuffing Mixture for Splits—Stuffing Mixture for Harness Leather—General Remarks on Stuffing—Seasoning for Oil-Grain Leathers—Sig. Liquor—Vinette—Vinegar Black—Iron and Logwood Black—Iron Liquor—Basic Sulphate of Iron—Commercial "Black Liquor"—Black Finishes or Dressings—Levant Ink—Black Finish for Enamelled Leather—Black Finish for Harness Leather—Black Finish for Harness Strap Leather—Finish Dressing to Give a Bright Polish—Solid Blacking Compounds—Compound for Flesh Blacking—Finishing Compound for Upper Leathers—Finishing Compound for Split Leathers—Finishing Compound for Flesh Side of Calf Leathers for Belts, etc.—An Oil Finish for Grain Side of Upper Leathers—Soap Blacking Compound for Flesh Side of Upper Leathers—Crown Soap Black—Compound for Pasting Upper Leathers—Size Paste—Soap Black for Splits—Stuffing Compound for Splits—Flour Paste for Splits—Gum-Tragacanth Mucilage—A Good Oil Finish—Curriers' Bottom Size—Curriers' Top Size—Scar Paste—Compounds for Preparing Enamelled and Patent Leathers—Enamelling Compound for Patent Leather—Varnish for Preparing Enamelled Leather—A Finish Coat—Japan for Patent Kid—Tawing Compound for Glove Leather—Substitute for Egg Yolk in Tawing Paste—Another Substitute for Egg Yolk—Tawing Paste for Danish Glove Leather.

CHAPTER V.

DYES AND STAINS FOR LEATHER . . . 85

Introduction—Staining Leather—Acids in Dyeing—Salts in Dyeing—Tanning and Colouring of Glove Leathers, Use of Red Arsenic—The Pickling Process—One Bath Tanning Process—Dyeing the Skins—Chamois Leather—Colouring Glove Leather—Colouring Alum Skins—Tawing Liquor—The Dyeing Operation—Chrome Followed by Vegetable Tannage.

CHAPTER VI.

PAGE
NATURAL AND ANILINE DYE-STUFFS . 101

Annatto—Turmeric—Weld—Fustic—Saffron—Orchil Paste—Cudbear—Brazilwood—Peachwood and Limawood—Cochineal—Cutch—Logwood—Indigo—Aniline Colours for Leather Dyeing, Acid Colours—Basic Colours—Dianol Colours—Chlorazol Colours—Dissolving Coal Tar Colours—Drum Dyeing—Paddle Dyeing—Tray Dyeing—Chrome Leather Dyeing—Staining—General Remarks—Dyeing Wool Skins—Dyeing and Colouring Skins with the Hair or Fur on—To Colour Fur—Bugh's Method—To Dye Rabbit Skins Black.

MISCELLANEOUS RECIPES 115

Black Lacquers—Bronze-Coloured Lacquer for Shoes and Morooco Leather—India-Rubber Varnish for Leather—Finishes for Preserving Aniline Dyes on Skins—Transparent Leather—Cement for Leather or Rubber—To Prepare Sheepskins for Mats—Cements for Leather—To Join Leather to Metal—To Join Leather to Pasteboard—Black Kid Reviver—To Preserve Egg Yolk—To Protect Furs against Moths and Insects—To Imitate Sable Skin—Decorative Gilding on Leather—To Harden Hemlock—Tanned Sole Leather—To Renovate Black Suede Shoes—Renovating Paste for Patent and Enamelled Leathers—Edge Stain for Black Harness—To Render Sole Leather Waterproof—White Bottom Wash for Sole Leather—White Bottom Finish—To Clean Furs—Glove Cleaner—To Clean Washleather or Doeskin—A Grease Extractor—Wool Washing Compound—Mordant used in Dyeing Russia Leather—To Cure Light Skins with the Hair or Fur on—General Formula for Tanning or Currying Fur Skins—Indian Native Tan Buckskin—Preservative Compound for Furs and Skins—Moth Destroyers—Liquids for Destroying Moths.

CHAPTER VII.

CHROME TANNING 135

Single Bath Liquors—Chrome Alum Liquor—Procter's Glucose Liquor—Hypo Liquor—Two-Bath Chrome Liquors—Methods of Chrome Tanning—Stuffing Compounds—Treatment of Waste Liquors.

CHAPTER VIII.

USEFUL RECIPES AND METHODS . . . 142

Wax Polish for Russet Shoe Leather—Staining Rein and Bridle Leathers—Saffron Stain—Phosphine Stain—Renovator for Patent and Enamelled Leathers—Russia Odour—Black Wax—Curriers' Stuffing for Satin Hides—A Paste for Satin Hides—Finish for Satin Hides—Stuffing for Dongola Leather—Seasoning for Dongola Leather—Blacking for Dongola Leather—Seasonings for Levant Goat—Paste for Wax Calf and Splits—Preparation of Blood Albumin—To Make Natural Albumin—To Prepare Patent Albumin—Caseine—To Prepare Caseine from Milk, Soap, Fat-Liquors—Fat-Liquors for Chrome Calf—Chrome Sheep—Chrome Kid—Vegetable Tanned Calf—Sheep Leathers—Sulphonated Oil Making—Artificial Degras—Recovery of Grease from Whitenings, etc.—Bleaching of Dark-Coloured Fats—Waterproofing Sole Leather—Seasonings for Chrome Sheep—Coloured Sheep Leather—Willow Calf—Black Chrome Calf—Black Chrome Goat Finish—Coloured Chrome Kid—Wax Finish for Russet Calf—Glue Glaze for Black Leather Goods—Finish for Legging Leathers.

INDEX 159

CHAPTER I.

BOOT AND SHOE BLACKINGS, POLISHES, GLOSSES, DRESSINGS, RENOVATORS, ETC.

In the following recipes and formulæ will be found working instructions for preparing many well-known kinds of boot blackings, polishes and creams, and the variety of recipes give products that are suited for every kind of boot and shoe leathers, from the cheapest Leeds kip to the highest class of ladies' and children's boots and shoes.

The qualities of the several products vary so much, and yet " overlap " each other, so to speak, that it is not easy to classify them into definitely distinct classes, but as far as possible the recipes have been grouped roughly into classes which bear a resemblance in cheapness of cost and nature of compounds, while each recipe is headed with a description of the purpose for which the product is best suited.; for, of course, a polish, gloss or cream that is suited for one special kind of leather is not always suited for other kinds of leather as well; therefore the would-be manufacturer who wishes to produce an article of a special kind will be best served by selecting several formulæ for trial and choosing that which suits him best.

Boot Blackings, Polishes and Creams.

Owing to the many varieties of leather now used in making boots and shoes, there is an equally great diversity in the nature and composition of the blacking or polish required for renovating same ; thus, for example, a blacking to be polished by brushing that is suited for common calf or wax leather is not well suited for the expensive glacé kid leather. Again, those renovating compounds that are laid on the leather with a sponge are not suited for one and all alike. Dull kid, such as the uppers of gentlemen's boots are at times made of, requires a different compound to satin calf, Dongola, Memel or Cordovan leather. So likewise those renovating compounds that are self-shining, and only require to be laid on with sponge or brush and leave a brilliantly polished surface, differ according to whether the leather is "patent," enamelled or glacé. To prevent confusion the formulæ are divided into various classes, *viz.* :—

Common boot blackings.
Paste and liquid to be polished by brushing.
Blacking compounds for ladies' and children's boots.
Renovating compounds for special leathers of boots and shoes.
Miscellaneous blackings, dressings, polishes, renovators, etc.

COMMON BOOT BLACKINGS.

The ingredients of these compounds are subjected to a preliminary mixing, and then the mixture is put through a mixing mill, either an edge runner (for large quantities) or a hand mill similar to a paint mixer.

The common qualities of paste blackings are made with lamp or carbon blacks, but the better qualities are made with bone-black, because on treating this animal black with sulphuric acid, the phosphate and carbonate of lime it contains are converted into sulphate of lime, and during this action the black pigment swells up (intumesces) considerably, and thereby becomes very finely divided, and thus gives a better polish when submitted to the friction of brushing.

The sulphuric acid also reacts with the oil and treacle used and chars them, thus leading to the production of carbon that assists in the colouring and polishing properties of the blacking. The black component of the blacking—whether it be animal (bone), or vegetable (lamp-black), or mineral (from the smoke of hydrocarbon oils)—is the polishing ingredient, but to cause these components to adhere to the leather, it is necessary to make use of some suitable agglutinant that will cause the black solid matter to adhere to the leather in the state of a thin coating. Hard drying agglutinants like glue are not suitable; gum-arabic under certain conditions may be used, but for common blackings that article is too expensive, therefore treacle or sugar are made use of, and a little glycerine is sometimes used so as to keep the mixture moist and prevent it drying up.

In addition to the above ingredients, an admixture of oil of a non-drying nature, such as sperm, seal, cod-liver, or even lard is used; oils obtained from the distillation of rosin, and petroleum and paraffin oils of all kinds, although they do not readily dry, are not fit for use in blacking-making.

Formula No. 1. *Paste Blacking.*

Ingredients.—Bone-black.
Glucose.
Sulphuric acid.
Sperm oil.
Carbonate of soda.
Water.
(Sugar may replace the glucose.)

Method of Preparation.—Dissolve the sugar or glucose in sufficient water to form a syrup. Take 5 lb. of this syrup and mix it with 5 lb. of bone-black in a vessel that will not be affected by acid, add 2½ lb. sulphuric acid, and stir the mixture until homogeneous and it exhibits a shining surface when it rests undisturbed. Separately dissolve 1 lb. of carbonate of soda crystals in just sufficient water to dissolve them, and then boil the lye thus made with 10 lb. of sperm oil. Stir the whole time until the whole forms a thick liquid, then stir in the bone-black and glucose and mix well by stirring or putting through a mill.

The blacking is ready for putting in tins, boxes, or forming into cakes.

The consistence can be varied by altering the proportions of the oil and bone-black.

Formula No. 2. *Fluid Blacking.*

Ingredients.—10 lb. bone-black or ivory-black.
10 lb. treacle.
1 quart olive oil.
10 oz. gum-arabic.
5 gallons of water.
2½ lb. oil of vitriol.

Method of Preparation.—Mix the oil of vitriol and the bone-black, separately dissolve the gum-arabic in the water, and then dissolve therein the treacle, and mix this compound with the bone-black; finally stir in the oil and compound well by putting the mixture through a mill.

Another way of incorporating the oil of vitriol is to dissolve the gum in about its own weight of water, and then mix them with the oil to form an emulsion, and add this emulsified oil last of all to the mixture of the other ingredients.

Formula No. 3. *Paste Blacking.*

Ingredients.—10 lb. bone-black.
2½ lb. sulphuric acid.
1 fluid pint cod-liver oil.
2 lb. treacle.
2½ oz. Prussian blue, powdered.
Stale beer, q. s.

Method of Preparation.—Mix the acid with the bone-black and well stir the mixture, then put in the treacle and well incorporate that body, and finally reduce to a suitable consistency with beer; vinegar may be used instead of beer, but there is no advantage in adding vinegar unless a salt of iron is used as a component of the blacking. The Prussian blue increases the richness or depth of the black. It should be mixed with the bone-black by sifting it therewith.

Formula No. 4. *Fluid Blacking.*

Ingredients.—7 lb. bone-black.
7 lb. treacle.
½ gallon boiling water.
42 oz. oil of vitriol.
1 pint of fish oil.
Stale beer or vinegar, q. s.

Method of Preparation.—Mix the bone-black, treacle and water, then add the acid and allow it some hours to rest, then mix in the oil, and if required reduce to the desired consistency with beer or vinegar.

Formula No. 5. *Paste Blacking.*

Ingredients.—Bone-black.
Neatsfoot oil.
Brown sugar, or molasses.
Vinegar.
Sulphuric acid (vitriol).

Method of Preparation.—Mix equal weights of bone-black and sugar, and then take sufficient neatsfoot oil to produce a stiff paste; separately mix 3 pints of vinegar with 1 oz. sulphuric acid and add as much of this mixture to the black compound as will reduce it to the required consistency.

Formula No. 6. Paste Blacking.

Ingredients.—10 lb. animal black.
2½ lb. sulphuric acid.
1 quart of fish or rape oil.
Strong solution of soda.
5 lb. treacle.
1 to 2 quarts of a solution of gelatine and glycerine.

Method of Preparation.—Mix the animal black and acid together until free from lumps, and leave the mixture for ten or twelve hours, then add the oil and well stir the mixture until the oil has become incorporated, then neutralise the acid by slowly stirring in the soda solution, and continue stirring till the mixture ceases to froth or effervesce, then put in the treacle and finally add the solution of gelatine and glycerine; mixing more or less of this solution according to whether the blacking is to be paste or fluid. The solution of gelatine and glycerine is made by dissolving best cabinet-makers' glue, 1 part in 4 parts of hot water, and then adding to every 40 oz. of this solution 1½ oz. of glycerine. This compound gives a brilliant polish, but unfortunately, owing to the presence of the gelatine and glycerine, it is very easily affected by damp, and becomes mildewed when covered up in tin boxes. It is best put up for sale in oilskins or cake form.

Formula No. 7. Paste Blacking.

Ingredients.—84 lb. bone-black.
56 lb. treacle.
7 lb. linseed oil.
5 lb. oil of vitriol (sulphuric acid).
Water, q. s.

Method of Preparation.—Mix the vitriol with the bone-black, and in twelve hours' time grind up into the treacle and a little water, and then incorporate the oil and reduce to desired consistency with water. The use of acid in blacking tends to rot the leather; in the following two formulæ, however, a most excellent product is obtained without the aid of acid.

Formula No. 8. *Gutta-percha Blacking.*

Ingredients.—	60 lb. of glucose syrup.
	18 lb. lamp-black or carbon-black.
	3 lb. bone-black.
	3 lb. gutta-percha.
	5 lb. olive oil.
	1 lb. stearin.
	35 oz. gum-arabic.
	96 oz. water.

Method of Preparation.—First dissolve the gutta-percha by cutting it up into small pieces and heating it in a suitable vessel over a fire, and when nearly melted stir in gradually the olive oil, and when the mixture is entirely fluid add the stearin. Separately put the glucose syrup into another vessel, add the lamp- or carbon-black, and also the bone-black, and mix well together. In a separate vessel dissolve the gum in the water, and if desired to perfume the mass a suitable essential oil or other substance, as of lavender, cloves, nitro benzene (mirbane oil), etc., may be added, according to requirements.

To compound this mixture gradually stir the gutta-percha mixture into the mixture of lamp-black and syrup, the mixture being made warm, and when well incorporated add the gum solution and mix well. This blacking is diluted with three to four pints of water for use.

Liquid Blackings are usually composed of bone-black, sperm or other fish oil, sugar or treacle, sulphuric acid and vinegar, the latter fluid being the thinning medium. The following formulæ are typical of these liquid blackings:—

Formula No. 9.

Ingredients.—4 pints vinegar.
4 pints stale beer.
Sulphuric acid.
5 lb. bone-black.
4 lb. treacle.
12 lb. olive oil.

Mix the oil with the bone-black until of an homogeneous consistency, then add the sugar or treacle and a little vinegar so as to enable the whole to be well incorporated, then add sufficient sulphuric acid to cause the whole to intumesce on stirring; leave the mixture for several hours until it has thickened, and when all effervescence has subsided, but the mixture is not yet cold, add the vinegar and beer (in the order named) and well stir the whole until thorough incorporation of the ingredients results.

Formula No. 10.

Ingredients.—14 lb. animal charcoal.
1¾ lb. sperm oil.
1¾ gallons of vinegar.
1¾ gallons of sour beer.

(The vinegar may be omitted and double the quantity of beer be used.)

Method of preparation same as in last recipe.

Formula No. 11.

Ingredients.—8 lb. bone-black.
1 lb. olive oil.
4 lb. sulphuric acid.
Water, q. s.

Prepare as in last recipe, adding sufficient water to reduce the mixture to a fluid condition.

Superior Blacking Compounds and Dressings for Patent Leathers.

Ingredients.—8 lb. gum-arabic.
2 lb. treacle.
4 pints good black ink (from gall and iron).
16 fluid oz. vinegar.
16 to 20 fluid oz. methylated spirit.

Method of Preparation.—Crush up the gum and dissolve it in the ink, then add the treacle, and afterwards stir in the vinegar. Mix well and allow to settle, or else strain it and then add the spirit. An aqueous solution of soluble nigrosine will give a better black than ink.

A Special Dressing for dancing and dress shoes (glacé leather) is prepared from the following:—

Ingredients.—3 doz. eggs, white of.
2¼ fluid oz. methylated spirit.
1 lb. raw brown sugar.
Bone-black or lamp-black, q. s.

Method of Preparation.—Mix the spirit and white of the eggs together, then dissolve the sugar in the fluid, and finally stir the colouring matter into the mass sufficient to give the desired consistency, so as to enable the blacking to be laid on with a sponge.

A Special Liquid Blacking for High-class Boot Leathers.

Ingredients.—6 gallons methylated spirit.
6 oz. spirit soluble nigrosine.
7¾ oz. Bismarck brown B.
2 lb. camphor.
4 lb. Venice turpentine.
7 lb. shellac.
8 oz. benzine.
15 fluid oz. castor oil.
7 fluid oz. boiled linseed oil.

Method of Preparation.—Dissolve the nigrosine and Bismarck brown in 2 gallons of the methylated spirit, and then with the remainder of the spirit in a separate vessel dissolve the camphor, Venice turpentine and shellac, and in the mixture stir the castor and boiled oils, then mix this liquid with the coloured spirit, and after well incorporating by stirring, the blacking is ready for use. Lay on with a sponge. Another method is to digest the aniline colour in the spirit for some hours with agitation, then draw off the clear fluid or filter it; one gallon of the coloured spirit is mixed with four gallons of methylated spirit, and there are added:—

2⅓ lb. camphor.
4 lb. Venice turpentine.
7¾ lb. shellac.
Separately 1 gallon benzine is mixed with 13 fluid oz. castor oil and 7 fluid oz. boiled linseed oil.

Then this fluid is added to the methylated spirit compound. The above blacking is in the nature of a lacquer and is self-shining; it is useful for all leathers that are of a stout texture, but the shellac makes them brittle. The addition of the camphor, however, lessens this brittleness, and so likewise does the Venice turpentine. The gloss (for it is better so described as such than a blacking) is not very well adapted for the light leathers of ladies' high-class boots, because the gloss is waterproof, and a few accumulated layers of it clog up the pores of the leather and cause the latter to loose its elasticity and become harsh and crack.

A more suitable gloss for Glacé Leathers is this:—

Ingredients.—9 pints methylated spirit.
2½ lb. shellac.
5 oz. Marseilles soap.
8 fluid oz. glycerine.
1 oz. spirit soluble nigrosine.

Method of Preparation.—This compound is prepared by making three separate mixtures and then mixing the whole together thus:—

Put the shellac into a stone jar or bottle, and pour on it 5 pints of the spirit, and stand this vessel in a warm corner, so that the shellac can dissolve by slow digestion, giving the mixture an occasional shake or stir up. In a separate vessel put the soap, and pour on it 2¾ pints of the spirit, and stand the vessel in a warm place so that the soap dissolves, and when dissolved mix in the glycerine. In a third vessel dissolve the nigrosine in the remainder of the spirit. When these several mixtures are ready for use, first make them all hot, and then mix the soap and glycerine solution with the shellac solution, and afterwards add the spirituous solution of nigrosine and well shake the whole mixture, and then leave it undisturbed for two or three weeks, when it will be ready for use. The above gloss is laid on with a sponge, and it dries almost at once. In cold weather it may require to be warmed before use.

A Blacking that Restores the Surface of Leather roughened by wear is prepared as follows:—

Ingredients.—1½ gallons methylated spirit.
1 lb. shellac.
3 oz. camphor.
4 oz. lamp-black.

Method of Preparation.—Dissolve the camphor in the spirit, then dissolve therein the shellac, and when that has dissolved stir in the lamp-black.

Self-shining Blacking for high-class kinds of leather:—

Ingredients.—1 lb. gum-arabic.
6 oz. treacle or brown sugar.
1 pint black ink (from gall and iron).
8 oz. good vinegar.
4 oz. methylated spirits.
4 oz. olive oil.

Method of Preparation.—Dissolve the gum in the ink and when that has dissolved slowly incorporate the oil so as to form an emulsion; this is best effected by rubbing them together in a mortar until these ingredients are well combined, then slowly add the vinegar, stirring all the time so as not to separate the oil, and lastly work in the spirit in the same way.

This compound gives a good gloss but is not lasting, and, moreover, is not waterproof, but is washed off by wet; thereby it is unfitted for use on boots and shoes that are to be worn out of doors in wet weather, as the hem of the garment would be soiled by the blacking.

A Second Formula for a similar blacking is prepared from the following:—

Ingredients.—1 lb. gum-arabic.
1 pint good vinegar.
4 oz. olive oil.
3 oz. lamp-black.
½ oz. indigo (finely powdered).
6 oz. treacle.
8 oz. malt vinegar.
4 fluid oz. methylated spirits.

Incorporate all these ingredients as follows:—

Method of Preparation.—Dissolve the gum in the pint of vinegar and then rub up therein the lamp-black and indigo (having first mixed them together by sifting); when these powders are mixed in, slowly incorporate the oil and rub up until the mass is homogeneous, then work in the treacle, and afterwards in the order named the malt vinegar and spirits of wine; when well mixed put in bottles for use.

A much better *Self-polishing Gloss or Lacquer*, which is waterproof, is prepared from the following:—

Ingredients.—2½ gallons methylated spirits.
5 lb. shellac.
1½ lb. white wax.
2 lb. castor oil.
Lamp-black, q. s.

Dissolve the shellac in the spirit and separately dissolve the wax in the oil, then mix the two fluids (hot), and lastly work in the lamp-black until of a sufficient consistency.

The following Compounds are better described as *Dressings or Emollient Compounds* than blackings proper. They are waterproof, and partake somewhat of the nature of dubbin, but they are chiefly useful for the uppers of high-class leathers that do not require a brilliant polish; they can be used for bags, belts and similar leathers that do not require a high polish.

Ingredients (No. 1).—15 lb. wax.
1½ lb. tallow.
20 lb. linseed oil.
2 lb. litharge.
10 lb. treacle.
10 lb. lamp-black.
28 lb. turpentine.
½ lb. shellac.
3½ oz. of spirit soluble nigrosine.

Method of Preparation.—Put the oil into a suitable boiling vessel and add the litharge, and raise to a temperature of 230° to 250° F., and then mix in the wax and tallow and stir up well, then add the lamp-black and allow the mixture to cool, then thin down with the turpentine. Separately dissolve the shellac and nigrosine dye in the spirit, and finally mix this with the blacking compound.

Ingredients (No. 2).—9 lb. beeswax or ceresine wax.
3 lb. spermaceti.
35 lb. turpentine.
2 lb. asphalt varnish.
1 lb. borax.
2 lb. lamp-black.
1 lb. Prussian blue.
½ lb. mirbane (nitro-benzol).

Method of Preparation.—Melt the beeswax and spermaceti with the borax, and stir together until jellified, then dissolve the asphalt varnish in the turpentine, then mix the two and afterwards add the other ingredients in the order named. The mirbane gives a fragrance and disguises the odour of the turpentine.

A Compound that is suited for Bag, Belt, etc., Leather as well as boots and shoes, is prepared as follows:—

Ingredients.—16 oz. white wax.
8 oz. white soap.
4¾ pints water.
2 oz. gelatine or transparent glue.
3 oz. gum-arabic.
4 oz. brown sugar.
5 fluid oz. methylated spirit.
6 oz. drop black.

Method of Preparation.—Cut up the wax and melt it in water by making the water boiling hot; having soaked the glue in water for a few hours, put it into the boiling wax solution and afterwards the gum-arabic in powder, the sugar and white soap cut up in shreds, and heat the whole until homogeneous; then put in the methylated spirit and allow the compound to cool, then stir in the drop-black. For use, lay a thin coating of the dressing on the leather, and then polish by brushing with a stiff brush.

An Expensive but Good Quality Dressing is obtained from the following:—

Ingredients.—3 lb. lamp-black.
½ lb. bone-black.
5 lb. of a mixture of glycerine and treacle.
2½ oz. gutta-percha dissolved by heat in
10 oz. olive oil, and then
1 oz. stearin stirred into the gutta-percha solution.
5 oz. gum-arabic.

Method of Preparation.—Mix the lamp and bone-blacks with the glycerine and treacle and then mix this with the gutta-percha mixture; separately melt 5 oz. of gum-arabic in 24 oz. of water, and perfume this mucilage with 1 drachm of oil of rosemary and 1 drachm of essential oil of lavender, and mix them with the lamp-black compound; finally thin down for use with three or four times its weight of water.

A Dressing that is Suited for Soft, Dull, Calf Kid and superior quality kip leather of uppers is prepared as follows:—

Ingredients.—4 lb. gelatine or white glue.
4 lb. Castile soap (or white palm-oil soap).
1 lb. yellow wax.
1 lb. neatsfoot oil.
Lamp-black, q. s.

Method of Preparation.—Soak the glue in water for some time and then pour off superfluous water, and finally melt the glue in a steam-jacketed kettle. Separately cut up the soap and dissolve it in sufficient water by heating it until all the soap has dissolved and mix it with the glue solution boiling hot, then cut up the wax and put that in and continue heating and stirring until dissolved, then put in the neatsfoot oil and sufficient lamp-black to give colour and consistency. Mix well, and it is ready for use at once.

A Waterproof Dressing or "Dubbin" is prepared from these:—

Ingredients.—1 lb. black rosin.
1½ lb. beeswax.
¼ lb. lamp-black.
1 lb. Prussian blue.
Turpentine, q. s.

Method of Preparation.—Melt the rosin and beeswax together, separately mix the lamp-black and Prussian blue by sifting, and then mix that in the rosin mixture, allow to cool, and then dilute with the turpentine to a suitable consistency.

Another Good Waterproof Dressing for winter use is this one:—

Ingredients.—15 oz. spermaceti.
3¼ oz. india-rubber.
2½ lb. tallow.
11 oz. lard.
1¼ lb. amber varnish.

Method of Preparation.—Melt the spermaceti and tallow together and then add the india-rubber cut up small, and when it is dissolved put in the lard, and finally the varnish, and when all is well incorporated, by stirring together while hot, the dressing is ready for use.

The following is a Fluid Gloss suited for Glacé Leathers:—

Ingredients.—1 gallon vinegar.
½ gallon water.
1 lb. white glue.
6 oz. logwood extract.
1 oz. soft soap.
1 oz. isinglass.
1 oz. indigo (powdered).

Method of Preparation.—Mix the vinegar and water and then put in the glue and heat the mixture to boiling. When the glue has dissolved put in the logwood extract and boil for half an hour, then put in the soft soap, isinglass and indigo, and continue the boiling for another ten minutes; afterwards strain through muslin, and when cold bottle for use. Brush off all dirt, etc., from the leather and then lay on the above dressing with a sponge and allow it to dry.

A Second Formula for a similar liquid dressing is this:—

Ingredients.—1 gallon vinegar.
½ gallon water.
1 lb. white glue.
6 oz. logwood extract.
1 oz. indigo (powdered).
2 oz. bichromate of potash.
2 oz. gum tragacanth (powdered).
1 lb. glycerine.

Method of Preparation.—Boil all these ingredients together for several hours (do not let the fluid evaporate too much), then strain and put in bottles.

A Third Good Liquid Dressing for boot and shoe leather is this:—

Ingredients.—1 gallon beer.
1 oz. isinglass.
1 oz. gum tragacanth.
1 lb. glycerine.
2 oz. logwood extract.
1 oz. powdered galls.
2 oz. sulphate of iron.

Method of Preparation.—Steep the logwood, galls, gum and isinglass in the beer for a week, then add the glycerine, strain and dissolve the sulphate of iron in the mixture, and, if necessary, again strain the fluid, when it is ready for use.

This dressing is very useful for light leathers (glacé), etc.

A Liquid Dressing for all kinds of Light Leathers that require a soft but not brilliant gloss is obtained from the following :—

Ingredients.—2 gallons water.
6 oz. logwood extract.
6 oz. borax.
1½ oz. shellac.
¼ oz. bichromate of potash.
½ pint water.
6 fluid oz. ·880 ammonia.

Method of Preparation.—Boil the extract of logwood in half the water until dissolved, and in the remainder of the water boil the shellac and borax until the shellac has dissolved. Separately dissolve the bichromate of potash in half a pint of water, then add all these fluids together, and finally put in the liquid ammonia.

Glosses, Lacquers and Varnishes for Patent Leathers.

The following is a very simple formula, and gives fair results :—

Ingredients.—½ gallon methylated spirits.
1½ lb. shellac.
3 oz. cod-liver oil or sperm-oil.
½ to ¾ oz. lamp-black.

Method of Preparation.—Dissolve the shellac in the spirit, and separately grind up the lamp-black in the oil, then mix the two fluids; apply with a sponge.

The following Compound is suited for enamelled as well as patent leathers :—

Ingredients.—1000 oz. methylated spirits.
10 oz. mastic resin.
20 oz. sandarach resin.
8 oz. shellac.
Nigrosine to colour.

Method of Preparation.—Dissolve the nigrosine in the spirit, and then dissolve both the resins and shellac.

Reviver for Patent Leathers :—

Ingredients.—1 lb. treacle.
2 oz. gum-arabic.
4 lb. ivory-black.
Water, q. s.

Method of Preparation.—Dissolve the gum in a little water, then mix it with the treacle, and having stirred in the ivory-black, heat and stir until all the components are thoroughly incorporated.

Spirit Renovator for Patent Leathers :—

Ingredients.—1 gallon methylated spirits.
4 lb. shellac.
4 fluid oz. turpentine.
4 oz. camphor.
4 oz. castor oil.
2 oz. nigrosine.

Method of Preparation.—Dissolve 2 oz. of nigrosine in the spirit, and when dissolved put in the shellac and allow that to dissolve. Separately dissolve the camphor in the turpentine, and mix that with the oil, then mix this compound with the shellac lacquer. If required thin add more spirit. It is laid on the clean leather with a sponge, and requires no polishing, but gives a beautiful waterproof gloss.

Alkaline Renovator for Patent Leathers :—

Ingredients.—1 quart paraffin or petroleum oil.
5 fluid drachms oil of lavender.
5 fluid drachms citronella oil.
10 fluid oz. spirits of ammonia.

Method of Preparation.—Shake well before use, and after cleaning the leather free of all dirt, lay on the renovator with a sponge.

A Paste Renovator for Patent Leathers :—

Ingredients.—White wax.
Olive oil.
Turpentine.
Oil of lavender.

Method of Preparation.—Melt the wax and add sufficient oil to render it semi-fluid when cold, and while still warm add sufficient turpentine to make it into a paste, and add a little oil of lavender to perfume the compound. Apply a thin coat, and then polish by rubbing with a piece of clean linen rag.

A Wax Polish for Patent Leathers :—

Ingredients.—5 lb. white wax.
5 lb. crown soap.
25 oz. ivory-black.
5 oz. indigo (powdered).
50 oz. coco-nut oil.

Method of Preparation.—Melt the wax over the fire, and then dissolve the soap therein (cut up small); when homogeneous stir in the black and blue pigments, and finally the coco-nut oil; stir until all the ingredients are well incorporated, and stir until cold to prevent separation of the wax, then pour out into tins or moulds. A little of the wax is rubbed on the patent leather, and then a polish brought up by rubbing briskly with a piece of clean rag.

CREAMS, GLOSSES, POLISHES, ETC., FOR BROWN LEATHER BOOTS AND SHOES.

Brown boots and shoes have become very popular, so that there has arisen a big demand for suitable polishes. The leather is either wholly or partially chrome tanned, and finished on the grain (hair) side. To ensure best results the dirt should always be removed before the application of the polish, either by brushing, or by a weak solution of soap and water. One of the best kinds of dressings to apply to brown leather is a waterproof wax polish; the so-called creams are not absolutely waterproof, as they are made into a cream by the aid of soap; and as soap is soluble in water such creams do not resist the penetration of water into the fibre of the leather. Such a wax polish is far more emollient than any preparation in which shellac forms an ingredient.

A very simple Wax Polish for Brown Leather is prepared by dissolving :—

Ingredients.—5 lb. carnauba wax.
10 lb. paraffin wax.
½ oz. Bismarck Brown.
Turpentine, q. s.,

and when incorporated by stirring pour into tins or moulds to solidify.

A little of the wax when rubbed into the leather and polished by rubbing with a rag will render the leather non-porous and improved in appearance. This polishing wax is without colour, and therefore is suited to any shade of brown leather. It is also suitable for rendering brown canvas shoes waterproof by melting the wax and rubbing it into the canvas while warm.

A General Formula for Creams is the following :—

Ingredients.—1 lb. curd soap.
4¾ pints water.
2 lb. beeswax.
2 lb. turpentine.
Colouring matter as desired.

Method of Preparation.—Cut up the soap and dissolve it in the water by boiling, then separately dissolve the wax in the turpentine by heating the two together, and then slowly pour this into the soap solution, and briskly stir or whip the mixture until the mass is cool and of a creamy consistency. If the stirring be not continuous while the mass is cooling, the wax will granulate and separate from the other ingredients, whereas by constant brisk stirring, the mass becomes of a creamy consistency. Owing to the presence of the turpentine, aniline dyes cannot be mixed with the cream after it is made, but by dissolving them in the water before dissolving the soap therein, then the mass can be coloured by any of the aniline dyes soluble in water.

For a *Brown Cream* 16 scruples of Bismarck brown would be sufficient for the above quantity of ingredients. But as the above dye stains the leather a deeper brown as it is used time after time, it can be replaced with phosphine substitute, the quantity of which must be determined by the particular tone of brown colour desired. If the cream is to be coloured the fashionable Tony Red colour now being worn, Tony Red BD may be used. For a *black* cream use nigrosine. All these dyes must be mixed with the soap solution before incorporating the wax and turpentine. If the aniline dyes are not desired, the natural colouring matters, such as turmeric, annatto, dragon's blood, etc., may be used, and they can be first digested in the turpentine before dissolving the wax therein. For a *white* cream use white wax instead of beeswax, and do not add any colouring matter.

A Cheap Brown Cream for boots and shoes, bags, harness, etc., is the following:—

Ingredients.—4 lb. best yellow wax (ceresine).
½ lb. pearl ash.
2 lb. best yellow soap.
12 lb. water.
8 lb. turpentine.
½ lb. methylated spirit.

Method of Preparation.—Put the pearl ash into the water, and set it over a fire to boil, and scrape into it the wax and soap, and let the mixture boil until both soap and wax are dissolved. Stir well until homogeneous, and then allow to cool down somewhat, and mix in the turpentine, and lastly the spirit. Well mix the whole by stirring, and if required thinner add water, q. s. Well rub the cream into the leather, and when dry polish with a soft brush, and afterwards with a flannel.

A somewhat similar compound is the following :—

Ingredients.—6 lb. yellow wax.
5 lb. turpentine.
4 lb. lard.
3 oz. burnt sugar.
6 fluid oz. of a spirit varnish.

Method of Preparation.—Heat the wax, lard and turpentine together until homogeneous by stirring, then remove from the fire, and stir until creamy, then mix in the burnt sugar colouring, and finally the spirit varnish, and continue the stirring until the compound sets.

Tan Paste for Softening and Polishing Brown Leather :—

Ingredients.—6 lb. beeswax.
2 lb. lard.
½ lb. neatsfoot oil.
2 lb. turpentine.
Dragon's blood for colouring.

Method of Preparation.—Melt the wax and lard together, then add the oil and stir well, allow to cool and mix in the turpentine before the mixture cools too much, then add the colouring matter, stirring it well in. For use rub the polish on the leather, polish with a brush, and then rub with a linen rag.

Gloss for Brown Patent Leather :—

Ingredients.—2 lb. gum-arabic.
2 lb. treacle.
1 lb. vinegar.
½ gallon water.
16 oz. (by weight) of olive or almond oil.
16 oz. methylated spirits.

Method of Preparation.—Dissolve the gum in the water, and the treacle in the vinegar, mix these fluids together, then add the oil, and after shaking well and stirring put in the spirit, strain, and for use lay on with a sponge. This gloss, however, is not waterproof, and is easily washed off with a wet sponge.

A Waterproof Gloss for Brown Leather is prepared from the following:—

Ingredients.—4 lb. orange shellac.
1 lb. resin.
2 gallons methylated spirits.
4 oz. camphor (powdered).
1 oz. dragon's blood.
1 oz. annatto.

Method of Preparation.—Dissolve the shellac in the spirit, and when dissolved add the camphor (in powder), and then colour with the dragon's blood and annatto and shake well. Lay on the cleaned leather with a sponge, and if too thick warm it. To remove from the leather dip a sponge or rag into methylated spirits, and rub over the leather.

Dubbin for Russia Leather :—

Ingredients.—1 lb. palm oil.
3 lb. best yellow soap.
4 lb. oleic acid.
1¾ lb. tannic acid solution (1 oz. tannic acid, 6 oz. water).
Birch tar oil, few drops.

Method of Preparation.—Cut up the soap and dissolve it by heating in the oil to 100° F., then add the oleic acid and tannin solution, and stir until cold. Then add the birch tar oil. The resulting compound is a good grease or dressing for football boots and similar leathers.

Treeing Compositions.—All good quality boots and shoes should be kept on "trees" when not in wear, and an occasional "slicking" with the horn handle of a shoehorn or the bone handle of a knife will tend to keep the leather soft and pliable, and free from wrinkles. The following compounds are suited for use when treeing boots and shoes. For crup, calf, kip, and similar upper leathers, a solution of gum tragacanth is the most effectual composition in use. If the surface of the leather is rough, sponge it well with a little gum tragacanth mucilage, and when that is nearly dry slick the leather (*i.e.*, rub it smooth with a piece of bone or horn, or even polished steel), and when the dressing is dry lay on a coat of blacking and polish in the usual way by brushing. If the leather shows a brown appearance due to wear, just sponge it over with a little oil before laying on the gum tragacanth, and if the brown is very much apparent, colour the gum tragacanth with nigrosine soluble in water. The gum tragacanth is not easily soluble; it requires several days' digestion in water, but by acidulating the water with a little sulphuric acid or oxalic acid, the gum will then dissolve more quickly than when plain water is used. One oz. to 2 oz. of gum per gallon of water is sufficient, and before using the mucilage all white (*i.e.*, undissolved) lumps should be removed by straining the mucilage through canvas. If a soft drying mucilage is required, one that will not cake, a little neatsfoot oil should be mixed in with the gum tragacanth mucilage, the mucilage having been coloured beforehand with nigrosine or black ink.

If the boots show any exudation of the stuffing grease, they should be lightly sponged over with a sponge dipped in benzine, so as to remove the surface grease, and then the gum tragacanth mucilage applied and the slicking proceeded with as above described.

If boots are to be laid away out of use for some time they should be lightly sponged over with a little essential oil of cloves, almond, lavender, rosemary, or some other essential oil, which will prevent the leather becoming mildewed or mouldy.

To Renovate Calf-Kid Uppers prepare the following compounds:—

Method of Preparation.—Soak good glue in water, 1 part glue to 4 or 5 times its weight of water, for several hours, and then melt by heating to boiling-point, and pouring out the solution when formed to set into a jelly. Now put 16 oz. of the jelly into a saucepan, and mix with it ¼ oz. nigrosine, and when the glue has dissolved and the solution of a black colour, add a solution of soap and sperm oil, which is made separately, thus:—

Cut up 4 oz. of common soap, and dissolve it by boiling in 1 pint of water, and when dissolved add 1, 2, or 3 oz. of sperm oil, and when this has amalgamated with the soap solution, mix the soap solution with the glue solution, varying the relative proportions of each solution according to whether the dressing is to give a dull appearance or a soft sheen or gloss like satin calf; the greater the proportion of glue solution the more shine the dressing exhibits; if the soap solution preponderates, the dressing gives a soft, dull, but new appearance to the calf kid. The relative quantity of oil to use depends on the nature of the leather to be dressed; if satin calf, more oil and glue can be used; if dull (French) kid, then the soap solution should predominate. In this dressing, curriers, shopkeepers and boot manufacturers have a most valuable compound for renovating old stock and making it look equal to new.

A Renovating Dressing for glacé kid leather is obtained by using the following lacquer:—

Ingredients.—15 fluid oz. methylated spirits.
1½ oz. Venice turpentine.
3 oz. sandarach resin.
2 oz. mastic resin.
2 oz. elemi resin.
Nigrosine, q. s., to colour black.

Method of Preparation.—Digest all the solids in the spirit, and colour the lacquer thus made by digesting in the spirit beforehand, or else after solution of the solids, by the addition of sufficient quantity of aniline dye soluble in spirit.

For Brown Glacé Leather or brown patent leather use the following renovating fluid:—

Ingredients.—5 pints methylated spirits.
1 oz. dragon's blood or suitable aniline dye.
10 oz. gamboge (powdered).
2 oz. sandarach resin.
20 oz. shellac.
5 oz. Venice turpentine.

Method of Preparation.—Colour the spirit by digesting the dragon's blood and gamboge in it for several hours, and then strain or filter the coloured fluid, and in the filtrate dissolve the solid resins.

The last two preparations are laid on lightly with a sponge and allowed to dry in a warm air. They can be coloured any colour by using any suitable aniline dye soluble in spirits.

Bronze Lacquer for morocco leather of slippers, etc.:—

Ingredients.—¾ lb. aniline red.
¾ oz. aniline blue.
5 lb. gelatine.
2⅓ gallons acetic acid.

Method of Preparation.—Dissolve the dye in ½ gallon of the acid, and the gelatine in the remainder of the acid, and then mix the two fluids.

Crimson Purple Bronze :—

Ingredients.—6 to 8 oz. aniline violet.
40 fluid oz. water.
Egg albumen, q. s.

Method of Preparation.—Dissolve the aniline dye in the water, and lay it on the leather with a sponge, and when dry give an application of the egg white, which should be mixed with an equal bulk of warm water. Instead of the egg albumen the casein obtained from curdled milk dissolved in ammonia may be used to fix the aniline dye on the leather.

Bronze Lacquer for shoe leathers, dancing slippers, etc :—

Ingredients.—1350 parts (by weight) methylated spirits.
130 parts magenta.
65 parts aniline blue.
410 parts gum benzoin.
65 parts benzoic acid.

Method of Preparation.—Dissolve the dyes in the spirit, then add the acid, and finally the gum. This gives a splendid bright red bronze lacquer.

Wax Polish for bronze leather for bags and portmanteaus :—

Ingredients.—1 lb. beeswax.
1½ lb. spermaceti.
2¼ lb. mineral oil.
½ lb. turpentine.

Method of Preparation.—Melt the waxes, and when cool add the turpentine and then the mineral oil.

CHAPTER II.

HARNESS POLISHES, BLACKINGS, DRESSINGS, COMPOSITIONS, GREASES, SOAPS, BOOT-TOP POWDERS AND LIQUIDS.

Coachmen's Boot-top Powder :—

Ingredients.—1 lb. white burnt alum.
1 lb. white chalk.
1 lb. cream of tartar.
1 lb. magnesia.
1½ lb. oxalate of potash.
2 lb. gum-arabic (powdered).
2 lb. oxalic acid (powdered).
2 lb. pumice stone.

Method of Preparation.—Mix all the ingredients together by sifting several times through sieves of various meshes, and finally through a fine sieve. Put up in packets of about 1 oz. each.

For use dissolve one packet in 10 fluid oz. of distilled water, and shake up together; apply this fluid to the boot-top with a sponge, and then when dry polish by brushing with a special boot-top brush. Give a second application, if necessary, when the first is dry.

Pink or Flesh-coloured Boot-top Powder :—

Ingredients.—2½ lb. oxalic acid (powdered).
1½ lb. cream of tartar.
½ lb. sugar of lead.
1 lb. pumice stone.
2½ lb. gum-arabic.
3 drachms saffron.
4 drachms French carmine.

Method of Preparation.—Mix all the ingredients together in the powder state by sifting several times through hair sieves, and then divide into 3 oz. packets. For use mix one packet with a pint of distilled water, and apply as directed in last recipe.

Nut-Brown Boot-top Powder :—

Ingredients.—Same as in pink powder (see last recipe), but use a drachm of burnt sienna instead of the carmine.

Boot-top Liquids :—

Ingredients (No. 1).—1½ gallons water.
8 oz. oxalic acid (very poisonous).
8 oz. sulphate of zinc (very poisonous).

Method of Preparation.—For use wash the leather over with a sponge dipped in clean water, then rub it over with a sponge dipped in the above fluid.

Ingredients (No. 2).—Equal weights of butter of antimony (trichloride of antimony).
Cream of tartar.
Tartaric acid.
Burnt alum.

Method of Preparation.—Mix in twice its weight of sour milk.

Ingredients (No. 3).—1 gallon sour milk.
1 lb. alum.
1 lb. cream of tartar.
1 lb. magnesia.
1 lb. oxalic acid.
4 oz. salts of sorrel (oxalate of potash).
4 oz. acetate of lead.
4 gallons water.

Method of Preparation.—Mix all together, and boil until the solids are dissolved.

Brown Boot-top Liquid :—

Ingredients (No. 4).—1 lb. alum.
1 lb. annatto.
1 lb. oxalic acid.
½ lb. isinglass.
½ lb. acetate of lead.
¼ lb. oxalate of potash.
4 gallons water.

Method of Preparation.—Boil until the solids are dissolved.

Ingredients (No. 5).—1 oz. potassium chloride.
32 oz. distilled water.
2 oz. commercial hydrochloric acid.
48 oz. methylated spirits.
8 oz. essential oil of senna.

Method of Preparation.—Mix the potassium chloride with the water, and when dissolved add the acid, separately mix the spirit and essential oil, and then mix the two fluids. Apply with a clean sponge and dry at a gentle heat, then polish with a boot-top brush.

Waterproof Boot Grease :—

Ingredients.—1 lb. lard.
1 lb. olive oil.
¼ lb. caoutchouc.

Method of Preparation.—Melt together over a slow fire. This compound is applied to boot uppers and soles of boots which it is desired to render waterproof.

Renovators for Treeing Boots.—Kip and rough leather uppers of boots may be smoothed down and rendered capable of taking a polish by ordinary blacking when treated to the following dressing :—

Ingredients.—1 oz. nigrosine.
1 gallon water.
1½ oz. gum tragacanth (powdered).
¼ oz. oxalic acid.
½ pint neatsfoot oil.

Method of Preparation.—Dissolve the nigrosine in the water, and then dissolve therein the oxalic acid, then put in the gum tragacanth, and allow it a few days to dissolve until it forms a jelly. Give an occasional stir up of the mixture; when all the gum has dissolved, and there are no white lumps, add the oil so as to prevent the dressing caking together.

Military Boots, Belts and Breeches to whiten :—

Ingredients.—1 pint linseed oil.
5 oz. oxide of zinc.
Amber or copal varnish.

Method of Preparation.—Mix the zinc white with the oil, and rub the mixture into the buff leather it is desired to whiten, and dry the leather at a heat of 160° F. When dry roughen the whitened part by scouring with pumice powder, and give another coating, and after drying the second coat, give a coat of varnish.

Renovator for Buff Leather Riding Breeches :—

Ingredients.—16 oz. yellow ochre.
16 oz. pipeclay.
4 oz. starch.
½ oz. olive oil.
Water, q. s.

Method of Preparation.—Mix the oil and yellow ochre, then mix in the pipeclay and starch (in dry powder), and when well mixed pour in sufficient boiling water to make the whole of a semi-fluid or pasty mass, and allow it to become cold, when it should be laid on the leather, allowed to dry, then rubbed and brushed well.

Waterproof Harness Polish.—The following compound requires to be laid on warm, and when it is dry it resists water :—

Ingredients.—1 lb. glue.
4½ pints vinegar.
6 oz. gum-arabic.
30 oz. black ink.
¾ oz. isinglass.

Method of Preparation.—To prepare this polish soak the glue in one-third of the vinegar until perfectly soft, separately dissolve the gum in the ink, melt the isinglass in as much water as will just cover it, aiding solution by warming the water. To compound these ingredients put the glue into a boiler, and add the remainder of the vinegar, and heat the mixture until the gum has all dissolved, keeping the heat below boiling-point, then add the gum solution, and allow the mixture to reach the same temperature, and then put in the isinglass, beat up for five minutes, and then bottle for use. If left exposed to the air the compound dries to a tough rubber-like compound. For use the harness is cleaned, and the polish laid on with a dry (not wet) sponge.

Harness Lacquer for Black Harness :—

Ingredients.—2½ lb. shellac.
10 oz. sandarach resin.
5 oz. mastic resin.
3 gallons methylated spirit.
1½ to 1¾ lb. Venice turpentine.
Aniline black soluble in spirit, q. s.

Method of Preparation.—Colour the spirit with the nigrosine, and then dissolve the solids therein.

Dressing for Carriage Tops, etc.:—

Ingredients.—2 lb. glue.
3 lb. ordinary soap.
11 to 14 gallons water.
3 to 4 lb. spirit varnish.
2 lb. good white starch.

Method of Preparation.—Soak the glue in a portion of the water, and then heat the softened glue with the remainder of the water, and then cut up the soap and add that to the hot glue, and when dissolved stir in the varnish. Separately mix the starch with a little water, stir in and fully heat the mixture for five to ten minutes, stirring all that time. This dressing is ready for use when cold. By concentrating the compound by evaporation it may be made solid enough to bear putting up in tins or moulds, and then for use it only requires to be liquefied with water.

White Lacquer for White Enamelled Leather:—

Ingredients.—Carbonate of barium (precipitated).
Linseed oil varnish.
Copal varnish.

Method of Preparation.—Mix up some barium carbonate with linseed oil varnish, and lay this on the leather, then on this lay a coating of copal varnish in which carbonate of barium has been mixed, and allow the coating to dry, then rub down the coat of lacquer with pumice stone and a piece of felt, and polish with levigated bone ash.

Lacquer for Varnishes for Enamelled Leather Carriage Tops, and all leather that is required to be flexible:—

Ingredients.— ¼ lb. orange shellac.
¼ lb. sandarach resin.
1¼ lb. Venice turpentine.
1 lb. turpentine.
¼ lb. lamp-black.
24 lb. methylated spirit.

Method of Preparation.—Dissolve the shellac in the spirit, and the sandarach in the turpentine, then mix the two and add the lamp-black, well mix by stirring, and lay on with a sponge.

Elastic Varnish :—

Ingredients.—1 gallon turpentine.
8 oz. india-rubber.
Linseed oil.

Method of Preparation—To incorporate these ingredients dissolve the rubber in the turpentine, and reduce by standing until a jelly-like sediment is formed. Pour off any fluid turpentine from the settled sediment, and then mix equal quantities of the india-rubber jelly with hot linseed oil. Melt by a gentle heat. This varnish is useful when elasticity and flexibility are required, and a brilliant gloss not wanted. It is also suited to renovate india-rubber carriage aprons, goloshes, etc.

A Self-shining Lacquer for Enamelled Harness is prepared from the following :—

Ingredients.—3½ gallons methylated spirit.
2½ oz. yellow rosin (colophony).
½ oz. camphor.
1 lb. mastic resin.
2½ lb. sandarach resin.
5 lb. shellac.
2½ lb. Venice turpentine.

Method of Preparation.—Digest all the solids in the spirit, and to deepen the colour add sufficient nigrosine soluble in spirit.

A Polish for Black Harness is prepared from—

Ingredients.—1 lb. treacle.
2 lb. lamp-black.
2 teaspoonfuls of yeast.
2 oz. brown sugar.
2 oz. olive oil.
2 oz. gum tragacanth.
2 oz. isinglass.
1 cow's gall.
½ gallon stale beer.

Method of Preparation.—Dissolve the brown sugar in a little water, and add that to the treacle, then mix in the camphor, afterwards add the oil, and having dissolved the gum tragacanth in water, acidulated with sulphuric acid, mix that in and also the isinglass dissolved in a little warm water, finally add the gall, and then thin down with the beer, and stand in a warm place for an hour or two.

A Harness Oil for Black Harness is prepared from—

Ingredients.—¾ gallon methylated spirit.
3¾ gallons fish oil (sperm or cod-liver).
4¾ gallons Virginia oil.
14 quarts turpentine.
1¼ quarts coal-tar oil.
1 lb. lamp-black.
4 lb. shellac.

Method of Preparation.—Dissolve the shellac in the spirit, and then mix in the fish oil, then the lamp-black, and afterwards all the other ingredients in the order named.

The following blacks and dressings are so varied in composition that they do not permit of classification :—

Ingredients.—1 lb. mutton suet.
3 lb. beeswax.
3 lb. brown sugar.
6 lb. soft soap.
2¼ lb. lamp-black.
¼ lb. powdered indigo.
1 quart turpentine.

Method of Preparation.—Melt the suet and wax together, then add the brown sugar; the soft soap, the lamp-black and indigo are then added, and when all are mixed add the turpentine.

A Liquid Blacking for Harness :—

Ingredients.—1 lb. glue.
¾ lb. gum-arabic.
2 pints water.
21 oz. treacle.
15 oz. animal charcoal.

Method of Preparation.—Soften the glue and the gum in the water, and dissolve by gently heating, then mix in the treacle and bone-black, and evaporate until of a proper consistency, and put in corked bottles.

A Liquid Blacking that requires warming before use :—

Ingredients.—1 lb. treacle.
2 lb. lamp-black.
2 lb. olive oil.
2 lb. gum-arabic.
2 lb. isinglass.
6 galls. water.
2 fluid oz. methylated spirits.

Method of Preparation.—Melt all the ingredients together except the spirit, and then add that last. Warm the blacking before use, and lay on with a sponge.

A Waterproof Liquid Blacking is made from the following :—

Ingredients (No. 1).—1 gallon boiled oil.
½ lb. india-rubber.
½ lb. lamp-black.

Method of Preparation.—Melt the rubber in half the oil by heating, and then mix in the remainder of the oil, finally adding the lamp-black.

Ingredients (No. 2).—1 gallon of boiled oil.
1 lb. beeswax.
1 lb. colophony (rosin).

Ingredients (No. 3).—1 gallon olive oil.
32 oz. mutton suet.
8 oz. spermaceti wax.
8 oz. white wax.

Ingredients (No. 4).—1 gallon linseed oil.
8 lb. amber resin (powdered).
2 lb. asphaltum.
3 lb. gutta-percha.
2 lb. bisulphide of carbon.

Method of Preparation.—Dissolve the gutta-percha in the carbon bisulphide, and melt the amber and asphaltum in the oil by heating, then mix the two fluids.

[*Note.*—Carbon bisulphide is extremely inflammable.]

A Liquid Dye for Black Harness that is worn :—

Ingredients.—½ gallon turpentine.
5 lb. beeswax.
½ lb. oil soluble black.
1¼ lb. ivory-black.
1¼ lb. common soda.
2½ oz. isinglass.
1 gallon black ink (gall and iron).
1 gallon neatsfoot oil.

Method of Preparation.—Dissolve the wax in the turpentine, and dissolve the soda and isinglass in the ink, and rub down the blacks in the oil, then mix all together, and well stir. Shake up well before use ; lay on with a sponge.

Harness Pastes, Compositions, Dressings and Ball Blackings :—

Ingredients.—2 lb. common rosin.
3 lb. beeswax.
½ lb. lamp-black.
½ oz. Prussian blue.
Turpentine, q. s.

Method of Preparation.—Melt the rosin and beeswax together, and then add the black and blue pigments (previously mixed together by grinding); when the mass is homogeneous remove from the fire, and mix in sufficient turpentine to make the whole into a stiff paste; for use lay on lightly with a sponge, and polish by brushing with a soft brush.

Another Harness Paste which can be coloured black or brown is prepared from the following:—

Ingredients.—9 lb. stearin.
13½ lb. turpentine.
6 oz. animal black (or yellow ochre and water).

Method of Preparation.—Cut up the stearin and melt it in the turpentine, and when melted mix in the colouring pigment. Warm the paste for use, spread lightly on the cleaned harness, and then polish by rubbing with a piece of flannel or soft brush.

A Superior Waterproof Harness Paste is prepared from the following:—

Ingredients.—5 lb. white wax.
½ lb. rosin.
6 lb. vaseline.
2 lb. soft soap.
2 lb. treacle.
4 lb. lamp-black.
¾ lb. Prussian blue.
Turpentine, q. s.

Method of Preparation.—Melt the wax and rosin, and then stir in the vaseline, and afterwards the soft soap, and add the treacle, and finally the blue and black pigment (mixed together by sifting).

A Good Harness Oil:—

Ingredients.—3 lb. beef tallow.
1 lb. neatsfoot oil.
Bone-black, q. s.

Method of Preparation.—Melt the tallow but not hot enough to cause it to boil, then mix in the neatsfoot oil, and afterwards sufficient lamp-black to colour the mass.

Harness Composition:—

Ingredients (No. 1).—8 lb. beef suet.
2 lb. neatsfoot oil.
2 lb. white wax.
2 lb. gum-arabic (powdered).
1 quart turpentine.
Bone-black, q. s.

Method of Preparation.—Melt the suet and wax together. Then stir in the oil and gum, cool off slightly and add the turpentine, then incorporate the bone-black in sufficient quantity to make a stiff compound, then stir until cold, and form into balls or mould into cakes, or put it in tins while still plastic. For use the composition is warmed and lightly rubbed on the harness, and then a polish brought up by rubbing with flannel.

Ingredients (No. 2).—1 lb. hog's lard.
4 lb. neatsfoot oil.
4 lb. yellow wax.
5 lb. bone-black.
4 lb. brown sugar.
3½ pints water.

Method of Preparation.—Dissolve the sugar in the water, and having melted together the lard, wax and oil, and mixed therein the bone-black, stir in the sugar syrup, and heat the whole till boiling, and stir it until it is sufficiently cool to be moulded into cakes or balls.

A Harness Composition to be used with a sponge:—

Ingredients (No. 3).—1 lb. beeswax.
1 lb. soft soap.
2 lb. Prussian blue.
1 gallon black ink (gall and iron).
1 gallon turpentine.

Method of Preparation.—Melt the wax and soft soap over the fire, then stir in the other ingredients and simmer all together, then remove from the fire and stir until nearly cold; apply with a sponge, and polish by rubbing with a soft brush.

A Simpler Harness Composition consists of this:—

Ingredients (No. 4).—1 lb. white wax.
¼ lb. oil soluble black.
2 oz. Prussian blue.
2 oz. oil of thyme.
1 quart of turpentine.

Method of Preparation.—Slowly melt the wax, and when not too hot stir in the turpentine in which the black and blue pigments have been ground up; allow the mixture to boil and then add the oil of thyme; pour out into tins, and keep covered up. For use put a little of the composition on the harness with a stiff brush, and polish by brushing with a soft one, and afterwards polish with a chamois leather. The composition is waterproof, and suited alike to dull and enamelled leather harness.

A Superior Quality Ball Black is prepared as follows:—

Ingredients.—4 lb. beeswax.
1 lb. bone-black.
¼ lb. Prussian blue.
8 oz. linseed oil.
12 oz. turpentine.
4 oz. copal varnish.

Method of Preparation.—Grind up the blue and black pigments in the turpentine, then mix the oil and varnish, and having melted the wax stir in the black mixture, and when plastic form into balls. To prepare the above composition in paste form, add to the above ingredients, while still warm, 1 lb. soft soap mixed with 1½ lb. turpentine.

A Good Harness Dressing is made of the following:—

Ingredients.—1 lb. beeswax.
¼ lb. isinglass.
¼ lb. indigo.
4 lb. soft soap.
5 lb. glue.
1 lb. logwood extract.
½ lb. animal charcoal.
1½ gallons vinegar.

Method of Preparation.—Dissolve the logwood by simmering in the vinegar, and then strain it. Mix in the other compounds, and boil until the glue, etc., is dissolved, when it is ready for laying on with a sponge.

A very Simple Black Harness Renovator is made by dissolving 1 lb. of gum copal in sufficient raw linseed oil by heating it at 300° F., then dissolving therein 3 lb. of white wax, and mixing in 1 lb. of lamp-black; heat the mixture for five minutes to 200° F., then remove and stir until cold, and form into cakes or balls.

A Cheap Harness Oil consists of 24 oz. of lamp-black mixed with 1 gallon of neatsfoot oil, and ¼ gallon of vinegar black, 1 lb. palm oil, 3 lb. common soap.

A Wax Polish for Harness is made from these:—

Ingredients.—1 lb. white wax.
1 lb. crown soap.
2 lb. bone-black.
5 oz. indigo (powdered).
½ pint nut oil.

Method of Preparation.—Melt the wax and then add the soap, and continue heating until homogeneous, then mix in the pigments, finally stir in the oil, and after well mixing stir until cold, and while still plastic put into moulds or form into balls.

"Vaseline" Harness Composition:—

Ingredients.—12 oz. Prussian blue (powdered).
4 lb. lamp-black.
2 lb. treacle.
2 lb. soft soap.
6 lb. "Vaseline".
5 lb. ceresine wax.
8 lb. colophony (rosin).
Turpentine, q. s.

Method of Preparation.—Mix the blue and black powders in the soft soap by grinding them therein, and then warm the mixture and work in the treacle; separately melt the resin, ceresine and vaseline together, and then work that in the fluid compound; when homogeneous mix in sufficient turpentine to give the required consistency.

Harness Oil for General Use:—

Ingredients.—2 lb. asphaltum.
3 lb. beeswax.
½ lb. lamp-black.
1 oz. Prussian blue.
Neatsfoot oil, q. s.

Method of Preparation.—Melt the asphaltum, then stir in the wax, and when these two bodies are well mixed, add the lamp-black and Prussian blue, then thin with the neatsfoot oil sufficient to give required consistency.

A Good Harness Dressing is prepared for general use thus:—

Ingredients.—1 gallon neatsfoot oil.
2 lb. tallow.
2 lb. beeswax.
2 lb. beef tallow.
½ gallon castor oil.
1 oz. lamp-black.

Method of Preparation.—Put the first four ingredients into a boiler, and heat the mixture until homogeneous, then add the castor oil, and finally the black pigment; after well mixing strain through clean straining cloths, and the dressing is ready for use.

Harness Grease:—

Ingredients.—4 lb. ammonia soap.
1 lb. palm oil.
3 lb. common hard soap.
1¾ lb. tannic acid solution (9 parts of tannic used to 10 of water).

Method of Preparation.—Melt the oil and soap together, then put in the ammonia soap and the tannic acid solution, and well mix; keep in corked bottles; for use rub on only just as much of the paste as the leather will absorb. To prepare the ammonia soap heat 3½ lb. olive oil to nearly the boiling-point, and add ½ lb. liquid ammonia and stir until the odour of ammonia disappears.

CHAPTER III.

LEATHER GRINDERS' SUNDRIES.

Heel Balls.—These compounds are made of wax, lamp-black, turpentine, and some spirit varnish. The following formulæ give good products. It is usual with each maker to stamp each ball with his name or trade mark, and this stamping is done while the compound is plastic, or else by putting the compound into moulds when freshly made.

Formula No. 1.

Ingredients.—8 lb. beeswax.
1 lb. tallow.
1 lb. gum-arabic mucilage.
1 lb. lamp-black.

Method of Preparation.—Mix the lamp-black with the gum mucilage by grinding them together, then melt the wax and tallow, and after stirring to incorporate the two, stir in the lamp-black mixture, and well stir until homogeneous, then allow the compound to cool, and while still plastic cut into cakes with die stamp or else press in moulds.

Formula No. 2.

Ingredients.—16 oz. ivory-black.
16 oz. lamp-black.
4 oz. gum-arabic.
6 oz. raw brown sugar.
4 oz. glue, isinglass, or gelatine.
1 pt. water.

Method of Preparation.—Melt the sugar and gum in the water, and soak the glue or gelatine therein; melt this mixture by heating it, and then stir in the black pigments.

Formula No. 3.

Ingredients.—32 oz. beeswax.
8 oz. suet.
8 oz. ivory-black.
6 oz. lamp-black.
4 oz. gum-arabic.
4 oz. brown sugar.

Method of Preparation.—Powder the gum and sugar, and after melting the wax and suet together, and incorporating them by stirring, mix in the gum and sugar, and finally the black pigments, and put into leaden moulds.

Formula No. 4.

Ingredients.—16 oz. beeswax.
4 oz. suet.
4 oz. ivory-black.
4 oz. lamp-black.
2 oz. gum-arabic (powdered).
2 oz. brown sugar (powdered).
3 oz. black rosin (powdered).
2 oz. turpentine.

Method of Preparation.—Proceed to amalgamate the ingredients as in last recipe, melting the rosin along with the suet and wax, and when the mass is homogeneous allow to cool and then add the turpentine.

Formula No. 5.

Ingredients.—1 lb. beeswax.
1 lb. suet.
2 lb. gum-arabic (powdered).
8 lb. sugar candy (powdered).
1 lb. ivory-black.
1 lb. lamp-black.

Method of Preparation.—Melt the wax and suet together, stir in the lamp-black and ivory-black, and then mix in the gum and sugar, and when cool, but before hardening, put into moulds or stamp out into cakes with die stamp.

Bottom Washes or Finishes for Soles, Waists, etc., of boots and shoes. White finish for hemlock leathers :—

Ingredients.—1 lb. best white glue.
1½ lb. sulphate of zinc (powdered).
1 lb. sulphate of copper (ground).
1 lb. sulphate of magnesia.
1 lb. pipeclay (bolted).
2 oz. light yellow ochre.
4 gallons water.
2 lb. oxalic acid.
Gum tragacanth mucilage, q. s.

Method of Preparation.—Soak the glue in 1 gallon of the water, in a second gallon of the water stir up the pipeclay and the yellow ochre (having previously mixed them together by sifting), and in the remainder of the water dissolve the sulphate of zinc, copper and magnesia, and when each compound is prepared, mix them all together, and put in a vessel and raise the whole to the boiling-point, then dissolve the oxalic acid in the mixture, and finally add as much gum tragacanth mucilage as will make the mixture adhere to the leather when put on with brush or sponge. The leather should be buffed before applying the finish, and if the colour is very red, a second application should be given after the first has dried.

Buff Finish for Soles and Waists of Boots and Shoes :—

Ingredients.—45 oz. pale chrome yellow (Paris chrome).
9 oz. chromate of lead (medium).
78 oz. pipeclay.
31 oz. alum (powdered).
31 oz. quercitron.
1 pint of sulphuric acid.
7 pints gum tragacanth mucilage.
7 gallons water.

Method of Preparation.—Mix the sulphuric acid with the gum tragacanth mucilage, and sift the solid ingredients together in the state of powder, then grind this mixture in the water to form a paste, and finally mix in the acidified gum solution, and boil the mixture for a quarter of an hour, then allow to cool, and for use apply in paste form, or else evaporate to dryness, and put up in powder for use as wanted; this powder is used by making it into a paste with a little water, and applied to the sole leather in the usual way by the boot finisher.

A Cream Finish for Sole Leather, Boot Tops, etc.:—

Ingredients.—1 lb. French chalk or talc.
8 oz. oxalate of potash.
1 lb. flake white (dry carbonate of lead).
½ lb. burnt alum.
1 lb. cuttlefish bone (powdered).
1 lb. precipitated sulphate of barium.
3 oz. chloride of tin solution.
2 gallons water.
4 oz. farina starch.

Method of Preparation.—Mix and incorporate by boiling all these ingredients in an earthenware vessel for five or ten minutes. The starch is previously mixed into a smooth paste with ½ pint water.

Cream White Sole Finish:—

Ingredients.—72 oz. French chalk.
6 oz. yellow ochre.
1 gallon water.
½ gallon gum tragacanth mucilage.
½ fluid oz. concentrated solution of oxalic acid.
Colouring matter (common laundry blue).

A very White Bottom Wash:—

Ingredients.—1 lb. French chalk.
½ lb. common chalk.
8 fluid oz. methylated spirits.
¾ gallon water (coloured sky blue with laundry blue).
½ fluid oz. concentrated solution of oxalic acid.

Method of Preparation.—Mix all the ingredients and heat, then add the gum mucilage sufficient to make a pasty mass. Buff the sole leather, and give two applications of the above finish, allowing the first to dry before applying the second.

A Waterproof Wax Finish for Sole Leather :—

Ingredients.—2 to 4 oz. stearine.
6 to 7 fluid oz. benzine.

Method of Preparation.—Dissolve the stearine in the benzine, and for use sandpaper the leather, and apply the solution rapidly with a brush, and polish the leather afterwards by slicking. Be careful not to allow the preparation to be used in a room where there is a naked light or fire burning, as the vapour of benzine is very volatile and inflammable, and if it comes in contact with a flame, an explosion of the vapour results.

Boot Powders for Tight Boots.—The powder used by shopkeepers for putting in boots to facilitate the insertion of the foot in same consists of (*a*) tannic acid, (*b*) soapstone (which is a variety of talc-steatite), which is naturally white, grey, green, or else artificially coloured by mixing it with a little colouring matter in spirits of wine or oil, and then drying the mass afterwards, so as to obtain the coloured powder in a dry state. French chalk powdered is also used for the same purpose. These powders are used by sprinkling them in the boot before drawing same on the foot. Silicate of magnesia is also called soapstone owing to its unctuous nature.

Spankum, Bosh, Fake, are the names given by boot finishers to the following compounds, which are used as ready and quick means of finishing boots and shoes. The method of using these compounds is this: The sole, waist, heel or edges are burnished in the usual way with "burnishing ink," and then the fake is applied with the finger-tip, and when dry it is polished off with a roll of felt, or cloth destitute of "nap". This is the process by which the high black (or colourless) polish is obtained on the soles of cheap leather and waists of gentlemen's boots and shoes. A colourless or "white" spankum is obtained by using heel-ball composition that has been made without any lamp-black or other colouring material. Colour can be given to the composition by staining the turpentine by steeping in it dragon's blood or turmeric for a week.

Ingredients.—20 fluid oz. turpentine.
12 heel-balls.

Method of Preparation.—Melt the heel-balls by heating them in a suitable vessel, and when semi-fluid and not too hot add the turpentine and mix well by stirring with a wooden stirrer. To test the quality of the "spankum," take out a little of the mixture on the stirrer, and drop it on a plate or piece of metal; it should set at once; and if it can be smeared readily by touching with the finger-tips it is ready for use, if not, more turpentine should be added until the desired consistency is obtained.

Another formula is to take equal weights of heel-ball and beeswax and dissolve them in naphtha.

Solution Wax is a compound used for purposes identical with "spankum"; its composition is as follows:—

Ingredients.—16 oz. black pitch.
1½ oz. beeswax.
1½ oz. rosin.
2 heel-balls.
1 pint boiled oil.

Method of Preparation.—Put into a suitable vessel, and slowly simmer all together, stirring until a homogeneous mass is obtained. To use in cold weather a large quantity of oil is required.

Shoemakers' Waxes :—

Ingredients.—40 lb. rosin.
4 lb. heavy rosin oil.
4 lb. heavy coal-tar oil (free from creosote).
2 lb. chrome yellow.
2 lb. chalk.

Method of Preparation.—Put the rosin into a suitable boiler, and heat it until it melts, then add the rosin oil and coal-tar oil, and heat up the mixture until it boils, and continue the boiling until a sample, when taken from the boiler, can be kneaded and drawn out into threads between the fingers; then allow the mixture to cool, and while in a fluid state stir in the chrome yellow and chalk, both in the dry powdered state; mix thoroughly by stirring, and when homogeneous allow to cool until plastic enough to be moulded into suitable sized pieces of "cobbler's wax".

Another formula is to melt together tallow and Swedish pitch, and when plastic to form into balls; the quantity of tallow is best determined by experiment.

Bootmakers' Inks and Stains.—There is a great diversity in the composition of the various inks and blacking fluids used by bootmakers and curriers, each kind of ink being adapted for a particular kind of leather. The following formulæ are those inks which are best adapted to the use of the bootmaker and finisher. Other formulæ will be found in the chapter on curriers' ink stains, dyes, etc.

Finishers' Ink :—

Ingredients.—1 gallon water.
8 oz. logwood extract.
½ oz. bichromate of potash.
½ oz. gum-arabic.

Method of Preparation. Dissolve the logwood extract by boiling it in the water, then dissolve the gum in powder, and finally add the potassium bichromate, and allow several days' digestion, with frequent stirring up in an enamel basin. This is a very good ink for burnishing and staining purposes.

Staining Inks:—

Ingredients.—2 gallons water.
1 gallon vinegar.
3 lb. gall nuts (bruised).
1 lb. gum-arabic.
1 lb. sulphate of iron.

Method of Preparation.—Dissolve the galls in hot water for an hour or two, and dissolve the iron salt in the vinegar, then mix the two fluids and stir in the gum.

Another formula for a similar ink is composed of:—

Ingredients.—6 gallons water.
2 lb. galls (bruised).
½ lb. logwood extract.
1 lb. gum-arabic.
1 lb. sulphate of iron.

Method of Preparation.—Boil together for one to two hours and then strain.

The following formulæ give constituents which improve the above inks:—

Ingredients (No. 1).—½ pint of methylated spirit.
1 oz. glycerine.
2 oz. extract of logwood.
½ fluid oz. olive oil.
2 fluid oz. chloride of iron tincture.
½ oz. gum-arabic.
6 oz. water.

Method of Preparation.—Dissolve the logwood extract in the spirit by gently heating it, and then add the glycerine, gum and oil in the order named. When these bodies are incorporated add the tincture of iron to the water. For use 1 fluid oz. of this compound is added to 1 pint of the ink, made as above described, to increase the lustre and depth of colour.

Ingredients (No. 2).—1 oz. oil of hemlock.
2 oz. white Castile soap.
3 oz. chloride of iron.
4 oz. extract of logwood.
6 oz. glycerine.
8 oz. methylated spirits.
8 oz. water.

Prepare as in No. 1, and use ½ fluid oz. to the pint of ink.

Burnishing Inks. For Heel and Sole Edges:—

Ingredients (No. 1).—2 gallons methylated spirit.
2 to 4 oz. olive oil.
8 to 16 oz. extract of logwood.
8 to 16 oz. tincture of iron.

Method of Preparation.—Mix all together, and shake well before use; burnish with a hot iron at once.

Ingredients (No. 2).—1 gallon water.
4 oz. extract of logwood.
1 oz. ferrocyanide of potassium.
¼ oz. bichromate of potash.

Method of Preparation.—Dissolve the logwood in the water by boiling, then dissolve the ferrocyanide, and lastly the bichromate of potash; stir well and give a few days for digesting. This gives a good quick burnishing ink with hot or cold iron.

No. 3.—Make a solution of shellac by dissolving 2 oz. in 1 gallon of water, to which 1 oz. borax has been added. Boil the water and add the borax, and then put in the shellac, and continue the boiling until dissolved, then add ¼ fluid oz.

of glycerine, ½ oz. gum-arabic solution, or 1 oz. Castile soap. This fluid is mixed with finishing ink in more or less proportion.

No. 4.—*A Brown Finishing Ink* is prepared by making a strong decoction of catechu, and adding a little bichromate of potash.

No. 5.—*The following Burnishing Ink* is identical with some of the American inks:—

Ingredients.—2 gallons water.
1½ lb. logwood extract.
3 oz. shellac.
1½ oz. borax.

Method of Preparation.—Dissolve the extract of logwood in 1 gallon of water by boiling, and separately dissolve the shellac in the other gallon of water by making the water boiling hot, adding the borax and then stirring in the shellac. Continue the boiling until the shellac has dissolved. Separately make the following compound: Put half a pound or so of sulphate of iron crystals into a Winchester bottle, and pour on the crystals strong nitric acid just to cover the crystals, and cork up the bottle, and allow the mixture to stand until the crystals are dissolved, then cautiously put in some more crystals of iron sulphate, sufficient to allow some of the crystals to remain in the liquid undissolved. When putting the second lot of crystals into the bottle, avoid inhaling the fumes that are given of, and do not let too much air reach the contents of the bottle; in a few hours' time shake up the bottle, and then pour off the fluid for use. Now, to prepare the burnishing ink, proceed as follows: Take 1 measure of the logwood solution and mix it with 3 measures of the shellac solution, and after stirring up well put in $\frac{1}{10}$ of a measure of the liquid obtained from the sulphate of iron crystals, stir well, and expose the mixture to the air in shallow pans or tubs for a few hours, frequently stirring it. On exposure the mixture becomes of a deep bluish-black. This ink improves (and thickens) by keeping.

Finishing Ink :—

Ingredients (No. 6).—2 gallons water.
6 oz. logwood extract.
2 oz. borax.
1½ oz. shellac.
⅓ oz. potassium bichromate.
½ pint water.
3 fluid oz. ammonia.

Method of Preparation.—Dissolve the extract of logwood in 1 gallon of water, and in the other gallon of water dissolve the shellac by boiling it along with the borax. Separately dissolve the bichromate of potash in the half-pint of water, then mix all three solutions, and lastly mix in the ammonia.

Ingredients (No. 7).—½ gallon water.
10 oz. logwood extract.
8 oz. nut galls.
4 oz. Castile soap.
½ oz. glycerine.

Method of Preparation.—Boil all the ingredients together in the water.

Spirit Black Dressing or Ink :—

Ingredients (No. 8).—½ gallon methylated spirits.
6½ oz. shellac.
6 oz. asphaltum.
1 fluid oz. neatsfoot oil.
Lamp-black, q. s.

Method of Preparation.—Dissolve the shellac and asphaltum in the spirit, add the neatsfoot oil, and then add sufficient lamp-black to give the required depth of colour.

Ingredients (No. 9).—1 gallon water.
6 oz. logwood extract.
$1\frac{1}{2}$ oz. lamp-black.
1 oz. glycerine.
$\frac{1}{8}$ oz. bichromate of potash.
1 oz. sulphate of iron.

Method of Preparation.—Boil all together for half an hour.

Shellac Ink :—

Ingredients (No. 10).—Shellac.
Borax.
Aniline black, soluble in water.
Water, q. s.

Method of Preparation.—Dissolve 3 oz. of borax in 1 gallon of water, and then set this on to boil, and add sufficient aniline black (about 1 oz.) to colour it; boil ten minutes and then put in 5 oz. shellac, and continue boiling until dissolved; if not quite black enough, add a little more nigrosine.

Ingredients (No. 11).—6 oz. logwood extract.
1 gallon water.
$\frac{1}{8}$ oz. bichromate potash.
8 oz. gum-arabic.

Method of Preparation.—Boil the logwood extract in the water for half an hour, then put in the bichromate of potash, and after boiling for five minutes allow it to cool, and then put in the gum mucilage (made by dissolving the gum in just sufficient water to dissolve it); the ink is then ready for use.

Waxes for Sewing Soles, etc. :—

Ingredients.—10 oz. pitch.
10 oz. rosin.
1 oz. tallow.

Method of Preparation.—Melt together, and when cool enough pull it until it assumes a pale brown colour; this pulling effects a partial bleaching of the wax, whereby the black colour of the pitch is decreased.

Wax for Sewing Machines :—

Ingredients.—4 lb. rosin.
1 lb. pitch.
¼ lb. beeswax.
3 oz. tallow (refined).
3 oz. sperm oil.

White Wax for Waxing Hemp Sewing Threads, etc.—Mix together by heating equal weights of—

Virgin wax.
Rosin.
Flake white dry powder. (French chalk.)

Method of Preparation.—Melt the wax and rosin together first, and then stir in the white pigment.

Dubbin :—

Ingredients (No. 1).—1 gallon boiled linseed oil.
4 lb. mutton suet.
3 lb. yellow beeswax.
2 lb. common rosin.

Method of Preparation.—Melt all together by heating; for use warm the leather, and rub in the dubbin until the leather is saturated. It is suited alike for soles and uppers of winter boots.

Ingredients (No. 2).—1 gallon linseed oil.
1 lb. beeswax.
16 oz. turpentine.
4 oz. Burgundy pitch.

Method of Preparation.—Melt all together and use as in No. 1.

Ingredients (No. 3.)—1 gallon train oil.
1 lb. tallow.
2 lb. rosin.

Method of Preparation.—Melt the rosin and tallow together, and while hot mix in the oil and stir until cold.

Edge Stains for russet leathers, reins, belts, straps, etc. :—

Ingredients.—5½ oz. annatto.
8 fluid oz. liquid ammonia.
50 fluid oz. water.

Method of Preparation.—Dissolve the annatto in the liquid ammonia for twenty-four hours, and then add the water and boil until the mixture is reduced to half its original bulk. A shellac varnish laid on the stained part after it is dry preserves the stain from discoloration.

Orange Stain.—Dissolve chrysoidine in alum water.

Brown Stain :—

Ingredients.—1 gallon water.
8 oz. oxalic acid.
8 oz. hydrochloric acid.
½ oz. cochineal (bruised).

Method of Preparation.—Boil all together and strain.

Red Stain :—

Ingredients.—½ gallon water.
8 oz. cochineal (powdered).
1 quart liquid ammonia.

Method of Preparation.—Steep the cochineal in the water boiling hot for some hours, then add the ammonia, and after heating for some time, strain for use.

Crimson Stain is obtained by the aid of alum or tin salts laid on the leather, and then an application of a decoction of cochineal given.

A Brown-yellow Stain.—Boil Brazil wood in a solution of soda and water, and separately make a decoction of weld (dyers' weed) and mix the two solutions in the proportions which give the tone of colour desired. The above stains, although especially adapted for edge stains, may also be used as staining fluids for colouring skins (see chapter on Curriers' Dyes, Stains, etc.).

Glue Pastes for Skins.—The flesh side of belt, strap, rein, etc., leather is rendered smooth by putting on it a compound of glue and flour paste. In the chapter on Curriers' Seasonings, etc., will be found formulæ for preparing curriers' pastes and sizes, but the following compound is one that can be made and sold by the leather factor ready for use :—

Method of Preparation.—Put rye flour into a pan or basin and pour on it a boiling hot solution of water in which a little glue size (1 oz. size per pint of water) has been dissolved; stir the flour while pouring on the water, so as to make the mixture into a dough not quite so stiff as for puddings or pastry; stir or beat the dough for four or five minutes, then put a cloth over the pan, and allow it two days' rest. It is laid on the flesh side of the leather with a stiff brush, and smoothed down by slicking with a copper slicker, or else put under a rolling machine.

Waterproofing Compound :—

Ingredients.—1 lb. common dubbin.
1 pint raw linseed oil.
1 pint india-rubber solution.

Method of Preparation.—Dissolve by slow digestion in a warm place.

Waterproof Cement for Bootmakers :—

Ingredients.—1 lb. gutta-percha.
¼ lb. india-rubber.
2 oz. pitch.
1 oz. shellac.
2 oz. olive oil.

Method of Preparation.—Melt all together and use the cement hot.

Shoemakers' Paste :—

Ingredients (No. 1).—1 gallon water.
1 oz. alum (powdered).
Rye or wheat flour.
1 oz. rosin (powdered).

Method of Preparation.—Dissolve the alum in the water, and gently heat the water so that it is just tepid, then mix in sufficient flour to make of a creamy consistency; break up every lump of flour, and then put the mixture into a steam-jacketed kettle, and heat it until the paste boils, then add the rosin, and continue heating and stirring until it becomes a stiff paste, then allow to cool and put in stone jars covered with a lid.

Ingredients (No. 2).— 4 lb. good glue.
1½ gallons water.
6 to 8 gallons water, boiling.
30 lb. starch.
20 lb. cold water.
Carbolic acid or oil of cloves, q. s.

Method of Preparation.—Soak the glue in the 15 lb. of water for twelve hours, then slowly heat until the glue has dissolved, and add 6 or 8 gallons of water. Separately rub the starch up in the cold water, so as to form a creamy mass. Heat the glue solution until it boils, and then while boiling slowly pour in the starch paste, and stir all the time, then add sufficient carbolic acid or essential oil of cloves to prevent the mass fermenting (*i.e.*, becoming sour or mouldy; 1 to 2 oz. of either of these substances will be sufficient).

Shoemakers' Paste for Stiffeners :—

Method of Preparation.—Mix dextrine with cold water to form a paste of a suitable consistency.

Composition for Sole Leathers :—

Ingredients.—2 gallons rye flour paste.
2 gallons gum tragacanth mucilage.
1 lb. American isinglass.
1½ lb. oxalic acid.
¼ lb. gamboge.
3 lb. pipeclay.
Water sufficient to make 10 gallons.

Method of Preparation.—To incorporate these ingredients make the flour into a paste in the usual way, then add the isinglass, and stir until dissolved; when cold mix in the oxalic acid, gamboge, pipeclay and water, and give a week's rest before using.

Bleaching Compound for use with tanned leathers :—

Ingredients.—20 gallons water.
2 oz. tartaric acid.
2 oz. hydrochloric acid.
2 oz. cream of tartar.
2 oz. bisulphite of soda.

Method of Preparation.—Steep the leather for two hours in the fluid.

CHAPTER IV.

CURRIERS' SEASONINGS, BLACKING COMPOUNDS, DRESSING FINISHES, GLOSSES, ETC.

THE method by which the currier colours his leathers black depends on the nature of the leather under treatment, and the purpose for which it is to be used. Thus, for example, kip and calf leather for the uppers of men's boots are blacked by rubbing the grain side of the leather with a compound composed of soap and lamp-black. Other kinds of leather, such as glacé, box calf, etc., are blacked by subjecting the grain side of the leather to the action of a seasoning fluid which is usually a compound of iron, logwood, vinegar, etc., while the blacked leather is further treated with finishing dressings to give them a gloss or glazed appearance. These finishes or dressings vary to a great extent according to the currier's knowledge and experience. The purport of this book does not permit of full working instructions being given in the blacking process of any kind of leather. Such operations are pretty well known to curriers. What, however, is given in the present chapter is instructions for preparing the various compounds used by curriers in blacking and finishing black leathers. As each individual currier has his own pet formula for his seasoning vinette, gloss, "finish," etc., the formulæ herein given will enable him to make a selection of some one or other recipe which is better than his own pet formula. As far as possible instructions for using the compounds named in this chapter will be given, but any deficiency in such respect will be easily supplied by the currier from his own individual experience. Further instructions concerning the compounds used by curriers will be found in the chapter on dyes and stains for leather.

The leather, as the currier receives it from the tanner, is dry, harsh, and not flexible ; it is said to be "in the crust". The skin, in fact, is partly denuded of its natural gelatine during the processes it has undergone at the tanner's hands. Leather "in the crust" is not at all in a condition suited to be coloured for use in any of the arts. Consequently, the currier has to replace the natural gelatine with some substance that will fill the pores, and so render the leather tough and elastic and water-repellent. There are several compounds used for this purpose, their use being dependent on the particular kind of leather under treatment, including, tallow, stearines, mineral greases, etc., together with a mixture of cod or other fish oils. After damping, shaving or splitting, scouring etc., the leather is partially dried, set out on a suitable table, and the grease or "dubbin" applied to the surface with a brush, care being taken that the thin parts are not given too much of the fatty mixture. This process is called hand stuffing, but in the more modern procedure the half-dried leather is subjected to the action of a drum into which the melted fats are run.

The kind of machinery in use for stuffing generally consists of a revolving drum or stuffing wheel, the interior of which is first made hot by the injection of hot air or steam, and then the skins introduced with the stuffing compound ; the wheel is set in motion, then, by the combined action of the tumbling process to which the skins are subjected and the heat, an absorption of the stuffing compound occurs, whence the leather is thus ready for the next currying process.

The following formulæ are representative of the various stuffing compounds that are used for stuffing upper leathers.

Compound for Stuffing Kips :—

Ingredients (No. 1).—35 lb. stearine.
26 lb. tallow.
50 lb. cod oil.

The cod oil is warmed in a pan and the stearine and tallow added. With very little heating, these will soon dissolve, when the mixture is ready for use.

Another formula is :—

Ingredients (No. 2).—15 lb. stearine.
15 lb. tallow.
25 lb. cod oil.
25 lb. Yorkshire grease.
10 lb. degras.

Waxed Calf :—

The following may be used for the hard stuffing of waxed calf :—

Ingredients (No. 3).—30 parts good tallow.
40 parts cod oil.

The following mixtures are representative of the various stuffing compounds that are used for stuffing upper leathers :—

Ingredients (No. 4).—10 parts paraffin wax.
20 parts wool grease.
5 parts tallow.

The paraffin wax is melted and the wool grease and tallow incorporated by stirring. Wool grease is the oleaginous matter obtained from the washing and scouring of sheep wool.

Stuffing Mixture for Splits :—

Ingredients (No. 5).—10 lb. brown grease.
1 lb. tallow.
1 lb. stearine.

The ingredients are mixed in a pan by gentle heating and applied to the splits by drumming, using it at the rate of 1 lb. of grease per lb. of leather.

Stuffing Mixture for Harness Leather :—

Ingredients (No. 6).—65 parts good stearine.
35 parts mutton tallow.

The ingredients are melted together at a temperature of 70° C. and well stirred so as to obtain a homogeneous material.

General Remarks on Stuffing.—The amount of grease required for a given quantity of leather depends on the purpose for which it is required; thus, if a heavy waterproof leather is required for boot uppers such as memel, or satin, almost as much grease as the leather will absorb is given it. On the other hand, if a firm leather is wanted for harness, belting, strapping, etc., the quantity of grease used is much more limited, or the resulting leather would be too soft to serve the purpose required.

It must also be remembered that a good deal of dressed leather is still sold by weight, and the more grease the currier can work into it—within reason—the better profit he makes on his material. When hand stuffing was practically the only method in vogue, it was easy to detect the admission of too much grease, as the leather was dark, soft, and discoloured; in these days, however, of "scientific adulteration" it is comparatively easy to put hard stearine into the leather, and still to retain its light appearance.

In drum stuffing much damage is often done by putting the half dry leather into contact with the grease at too high a temperature, the result being that it may be so scalded that it is practically useless for the purpose required. A modern development in stuffing harness and belting leather is dipping the fully dry leather into the melted grease, and damping back and setting out by machine. In skilled hands a fairly good result is obtained, but it is a question whether the leather possesses the toughness and strength of fibre which the old currier obtained by hand stuffing.

Seasoning for Oil-Grain Leathers.—This is sometimes called "sig". It is a fluid which is put on the leather to dye or stain it, or otherwise prepare it for being blackened on the grain side. It is usually applied with a stiff brush, and the skin well brushed with it, so that the purple shade at first observable changes to a brown as the grain becomes saturated with the sig liquor. The liquor should not be allowed to penetrate to the flesh side, but it should be well rubbed in, so as to cut the grease, and then prepare the surface to receive the blacking compound, the latter being applied in the cold state.

Sig Liquor:—

Ingredients.—½ bushel logwood chips.
2 oz. washing soda crystals.

Method of Preparation.—Put the logwood chips and the soda into a bag, and suspend the bag in a barrel or vat, cover with water in such a way that steam may be directed into it; the heat of the steam will extract the colouring matter from the chips, and as the steam condenses a liquid extract will be formed; this can be strengthened by lowering the bag into the liquor now and again, and also by adding fresh chips daily.

The Blacking Compound for the leather that has been seasoned with the above sig liquor is prepared as follows:—

Ingredients.—8 lb. sulphate of iron.
6 oz. acetic acid.
4 oz. gall nut extract.
40 gallons water.

Method of Preparation.—Dissolve the ingredients in a few gallons of water by warming, and then add the remainder of the water. This blacking is laid on the seasoned leather with a soft, long-haired brush, giving two to three applications, and then the skins are first hung up for a few minutes to dry, taken down and folded grain side (*i.e.*, blackened side) in, and put in a pile to condition for the further process of pebbling or graining. Instead of the above blacking compound any of the following liquids may be used:—

Vinegar Black (*Vinette*).

Method of Preparation.—Put iron turnings (free from grease) into a wooden vat or tub, and cover them with malt vinegar or cider vinegar; heat up the mixture and let it rest for a couple of weeks, then pour off the fluid, allowing any sediment to settle before use.

Vinegar Black:—

Ingredients.—1 gallon good vinegar.
1 lb. lamp-black.
2 lb. iron filings

Method of Preparation.—Digest together for three weeks with frequent stirring.

Iron and Logwood Black:—

Ingredients.—11 lb. sulphate of iron.
5 lb. tartaric acid.
9 gallons water.
16 lb. logwood chips.
18 gallons water.
4 lb. naphthol black.

Method of Preparation.—Dissolve the iron sulphate and tartaric acid in the 9 gallons of water, and allow to settle, then draw off the clear fluid. Separately boil the logwood in the 18 gallons of water for an hour or two, then strain the fluid and dissolve in it the naphthol black, and finally add the iron solution. For use, grease in the leather is cut by brushing over with a solution of soda or ammonia, and then applying this seasoning black in the usual way with a brush.

Iron Liquor.—The colours obtained on leathers from this body vary considerably in depth and shade of colour; if the iron salt be too strong a greyish-black tone is obtained, while the previous application of a moderately strong fluid such as soda, alum, logwood, etc., effect totally different results in the colour obtained. The fluid obtained from the ingredients named below acts very powerfully, and should be used only in a dilute form. This liquid is much used in dyeing wool, cotton, and other textile materials.

Method of Preparation.—Put into an earthenware pan out in the open air some nitric acid of 64° Tw., and dilute this with water until of half the strength, then put in some clippings or turnings of sheet iron, free from grease, add these a few at a time while they continue to be dissolved with the escape of dark brown fumes (avoid inhaling these fumes, as they are very irritating to the lungs and poisonous). When these brown coloured fumes cease to arise do not put in any more iron. The finished product should stand at about 43° or 44° Tw.

Sometimes ferric sulphate (a persulphate of iron, or red sulphate) is used, in which case the iron liquor is prepared by adding to a solution of copperas half as much sulphuric acid as it already contains (*i.e.*, 18 per cent. oil of vitriol), and heating the mixture, adding from time to time small quantities of nitric acid to oxidise the iron.

For producing certain tones of colour either of the following compounds are employed:—

Ingredients (*a*).—15 gallons water.
24 lb. refined nitrate of soda.
20 lb. sulphuric acid.
Scrap iron as required.

Ingredients (*b*).—13 gallons water.
16 lb. nitrate of soda.
20 lb. sulphuric acid.
Scrap iron as required.

Method of Preparation.—The soda nitrate is first dissolved in the water, and then the acid and the iron added by degrees, being careful not to allow the heat of the mixture to become too hot. Do not make more than is required for use, as the liquor deteriorates in keeping. The soda nitrate should be free from chloride of sodium.

Basic Sulphate of Iron.—The following process produces a good iron liquor which is very useful in colouring leather of various tannages.

Ingredients.—Nitric acid.
Sulphate of iron (ferrous sulphate, green vitriol or copperas).

Method of Preparation.—Put some crystals of sulphate of iron into a stoneware jar or large glass bottle, and cover them with some nitric acid until the crystals have dissolved; gradually add more crystals until they cease to dissolve, keep the jar covered, so as to prevent the access of air and escape of ruddy fumes (avoid inhaling these fumes), and when all the acid has become saturated with the iron salt, pour off the fluid for use, and proceed to make a fresh quantity by pouring more acid on the crystals, and adding fresh crystals as required. For use this liquid is diluted more or less with water.

Commercial "Black Liquor" has a specific gravity of 18° to 20° Tw. It possesses an olive-green colour, a peculiar tar-like smell, and an inky taste. It is made by treating iron scraps with pyroligneous acid. Such liquor is sometimes made by mixing together solutions of acetate of lime or sugar of lead, and of green copperas, and after letting the mixture stand to settle, drawing off the clear fluid for use.

Black Finishes or Dressings.—After the leather has been blacked by the application of "seasoning," vinette, etc., it is necessary to apply a dressing or finishing black so as to impart a good appearance to the leather when finished ready for sale. The following compounds will indicate the lines on which these products are made:—

Black Finish:—

Ingredients (No. 1).—8 oz. gelatine.
8 oz. indigo.
16 oz. logwood extract.
64 oz. crown soap.
128 oz. softened glue.
4 gallons vinegar.

Method of Preparation.—Heat all these ingredients together until thoroughly mixed, lay on with a soft brush, and polish by rubbing with a woollen cloth or under the rolling machine.

Ingredients (No. 2).—1 gallon water.
1 lb. logwood extract.
1 oz. sulphate of iron.
¼ oz. bichromate of potash.

Method of Preparation.—Digest all together.

Black Finish (Levant Ink):—

Ingredients (No. 3).—1 gallon water.
2 oz. logwood extract.
1½ oz. sulphate of iron.
4 oz. gall nuts (crushed up).

Method of Preparation.—Mix by heating all together.

Black Finish for Enamelled Leather:—

Ingredients (No. 4).—1 lb. ivory-black.
1 lb. lamp-black.
1 lb. indigo (powdered).
6 lb. gum-arabic (dissolved in water).
8 lb. brown sugar.
½ lb. glue.
2 gallons water.

Method of Preparation.—Soak the glue in the water, then dissolve the sugar, afterwards mix in all the other ingredients, and heat up until homogeneous, allow it to boil a few minutes and then stir until cold.

Black Finish for Harness Leather:—

Ingredients (No. 5).—½ gallon vinegar.
1 oz. isinglass.
1 oz. indigo.
1 lb. logwood extract.
½ lb. soft soap.
1 lb. glue (softened by soaking in water).

Method of Preparation.—Mix and heat up to boiling-point, then strain, and when cool it is ready for use.

Black Finish for Harness Strap Leather:—

Ingredients (No. 6).—1 lb. black rosin.
1½ lb. beeswax.
¼ lb. lamp-black.
½ oz. indigo.
Turpentine, q. s.

Method of Preparation.—Melt the rosin and beeswax together, then mix in the black and blue pigments, allow to cool somewhat, and then thin down to a suitable consistency with the turpentine; give a coating by means of a rag, and polish by brushing with a soft brush.

Finishing Dressing to give a Bright Polish:—

Ingredients (No. 7).—1 gallon water.
8 oz. extract of logwood.
2 oz. ferrocyanide of potash (yellow Prussiate).
¼ oz. bichromate of potash.
Bullock's blood, q. s.

Method of Preparation.—Dissolve the logwood extract in the water by boiling, then put in the yellow Prussiate, and lastly the bichromate of potash. For use mix equal measures of this compound and fresh bullock's blood. The finish is applied to the skins with a brush, rubbing it well into the pores of the grain; then evenly distribute the dressing by going over the surface with a sponge, and hang up until they are fully dry. The next step is to give a final finish of some oil or oleaginous compound.

Solid Blacking Compounds.—Calf, kip, and other stout leathers for boot uppers are blacked by applying a coating of lamp-black mixed with soap, which is well rubbed into the flesh side by means of a short-haired brush. In some leather factories this blacking operation is performed by machines. These blacking compounds are applied to the flesh side of the leather.

Formula for Compound for Flesh Blacking:—
Ingredients (No. 1).—1½ gallons water.
1 lb. potash.
2¼ lb. lamp-black.
½ gallon fish oil.

Method of Preparation.—Dissolve the soda in the water and stir in the lamp-black, carefully crushing any lumps present. When an even mixture has been obtained, the fish oil is run in slowly with constant stirring; the whole is then boiled for a quarter of an hour with occasional stirring, allowed to cool, when it is ready for use.

Formula for Finishing Compound for Upper Leathers:—
Ingredients (No. 2).—1 gallon water.
6 oz. borax.
1½ lb. shellac.
1 gallon water.
6 oz. extract of logwood.
½ pint water.
3 drachms bichromate of potash.
3 or 4 oz. strong liquid ammonia.

Method of Preparation.—Dissolve the logwood extract by boiling it in one gallon of water, and separately dissolve the borax in the second gallon of water, and then set it on to boil, and while boiling put in the shellac, and boil till dissolved. Separately dissolve the potash bichromate in the half-pint of hot water, then mix the logwood and shellac solution together, and while still warm, put in the bichromate of potash solution, and allow the mixture to stand for some hours; skim off the bluish-grey scum, and then put in the liquid ammonia, and put in bottles tightly corked.

Finishing Compound for Split Leathers.—This compound is for finishing the inner side of split leather, and imparting to it the appearance of kip leather.

Ingredients (No. 3).—1 gallon boiled linseed oil.
16 lb. glue.
8 oz. vermilion, flake white, yellow ochre, or some other suitable colouring pigment.
Water.

Method of Preparation.—Soak the glue in twice its weight of water for twelve hours, then pour off superfluous water, and melt the glue by boiling it in a proper glue kettle (steam-jacketed boiler), stir in the oil, and when well mixed add the pigment. For use this compound is laid on the flesh side of the leather by means of a brush, giving two or more applications, and allowing each one to dry before applying the next, and after each coat is applied put the leather under the rolling machine, and finally soften it.

Finishing Compound for flesh side of calf leathers for belts, straps, etc.:—

Ingredients (No. 4).—11 quarts water.
2 lb. Paris white.
$\frac{3}{4}$ lb. curd soap (white toilet soap).
4 oz. egg albumen.

Method of Preparation—Allow the egg albumen to dissolve into 1-2 quarts of water overnight. Cut up the soap and dissolve it in water, and put in the egg albumen solution, and finally stir in the Paris white. For use, this compound is laid on the flesh side after the grain side has been dyed and finished. The above ingredients are sufficient for twenty-four calf skins. If the coated side of the skin be rolled under the machine, then a smooth surface is obtained.

An Oil Finish for Grain Side of Black Upper Leathers:—

Ingredients (No. 5).—1 gallon mineral oil.
1½ lb. brown grease.

Method of Preparation.—Put the grease and oil into a suitable boiling vessel, and heat it to 100° F., and for use apply the compound by means of a swab or sponge, giving more to the thicker part of the skin (shoulders and butt portions), and hang it up in the finishing room at the above temperature until the grease is well absorbed, and then pack in piles grain side to grain side, and if after a day or two some of the skins show a "hungry" feel on the surface, give another application of the "oiling off" compound.

Soap Blacking Compound for Flesh Side of Upper Leathers:—

Ingredients (No. 6).—12 lb. neatsfoot oil.
6 lb. tallow.
1 lb. lamp-black.

Method of Preparation.—Mix up the lamp-black in the oil, and then, having melted the tallow, stir in the lamp-black and oil mixture, and stir until cold, when it will be fit for use.

Crown Soap Black:—

Ingredients (No. 7).—1 lb. beeswax.
1 lb. crown soap.
2 oz. indigo.
4 oz. ivory-black.
30 oz. turpentine.

Method of Preparation.—Dissolve all together by heating slowly, and stir until cold.

Compound for Pasting Upper Leathers :—

Ingredients (No. 8).—1 gallon flour.
2 lb. hard brown soap.
1½ oz. tallow.
1 oz. beeswax.
Water, q. s.

Method of Preparation.—Make the flour into a paste, and then having cut up the soap, tallow and wax, boil them with the flour paste until they are dissolved, and then the compound is ready for use. This compound is laid on with a sponge, and when dry smoothed down by rolling it.

Size Paste :—

Ingredients (No. 9).—1 lb. good glue or gelatine.
2 oz. tallow.
Water, q. s.

Method of Preparation.—Soak the glue in water for several hours, then pour off unabsorbed water, and melt the glue by heating it, and while boiling hot put in the tallow, and finally dilute with water sufficient to make the whole of the desired consistency; apply with a sponge.

Soap Black for Upper Leathers or "Splits" :—

Ingredients (No. 10).—1 gallon water.
1½ lb. soap.
1 lb. lamp-black.

Method of Preparation.—Dissolve the soap in the water by boiling, and then mix in the lamp-black. The above blacking compound is finished by "oiling off" or "gumming" with a mixture of gum tragacanth and neatsfoot oil. Sometimes a solution of gum tragacanth alone is used.

Stuffing Compound for "Splits":—

Ingredients (No. 11).—9 lb. brown grease.
1 lb. English wool grease (or else a mixture of tallow and stearine).

Method of Preparation.—Heat up together in a steam-jacketed boiler. For use this stuffing compound is put into the wheel or drum with the "splits" in the proportion of 1 lb. of the stuffing grease per lb. of dry leather. Heat up the inside of the stuffing wheel to 140° F. before putting in the splits in a sammed condition, and give half an hour's drumming; the operator knows by experience when the leather has absorbed sufficient of the stuffing compound or not.

Flour Paste for "Splits":—

Ingredients (No. 12).—1 gallon flour.
1 lb. common laundry soap.
2 lb. tallow.
Water, q. s.

Method of Preparation.—Make a batter of the flour by stirring it into a tub with a little water, and then thin down this batter by the addition of more water until of a creamy consistency, stirring up with a stick or spoon until all lumps are smoothed out (use cold water); then cut up the soap and tallow in small pieces, and put them in the flour and water mixture, and heat the compound in a steam-jacketed boiler until all the compounds are well incorporated, and the mixture of a thick jelly-like consistence.

No. 13.—*Gum Tragacanth Mucilage* is prepared by dissolving 1 lb. of gum tragacanth in 5 gallons of water, allowing the gum to digest for three or four weeks, with a daily stir up of the mixture; for use all white lumps (*i.e.*, undissolved gum) should be picked out or else the mucilage strained. Gum tragacanth takes a long time to dissolve in water, several days in fact, but there is now on the market a gum tragacanth in powder form which does not occupy so long in dissolving. The gum can be caused to dissolve at a quicker rate if the water be acidulated with sulphuric or oxalic acid (1 oz. to 1 gallon of water) before putting in the gum. But for some purposes the presence of these acids are objectionable, particularly so if the gum tragacanth mucilage is required to be mixed with neatsfoot or other oil for "oiling off" or "gumming" purposes.

Gum tragacanth is frequently known as gum dragon.

No. 14.—*A Good Oil Finish* for "oiling off" is made by 7 parts of cod oil with 3 parts of mineral oil (all parts by measure), while for the final gumming a mixture of 7 parts of gum tragacanth mucilage and 3 parts of flour paste are sometimes used, the gumming compound being reduced to a suitable consistency with water so as to form a creamy consistence.

Curriers' Bottom Sizes.—After the leather has been whitened, either by machine or hand sleaker, grained and glassed, it is coloured with the lamp-black mixture previously described, "smutted," *i.e.*, the surplus colour rubbed off by the hand, and is then given a bottom size. This may be brushed or sponged on the leather in a weak solution, and then well glassed in. The bottom-sized leather is then hung up to dry before the final top-sizing takes place.

The following are two excellent recipes for bottom sizing:—

Ingredients.—1 lb. best glue.
¾ lb. soft soap.
1 lb. flour.
¼ lb. sugar lead.

Soak glue overnight in water, and dissolve by boiling in about a gallon of logwood liquor; whilst still hot the soft soap is stirred in, followed by the flour previously made into a thin paste. The sugar of lead is then added. The above is allowed to cool, and diluted to suit requirements.

A modification of the above may be made by replacing the sugar of lead by ½ oz. of copper sulphate.

Curriers' Top Size.—Following on bottom-sizing, the final top-sizing takes place—a most important feature in dressing wax leather, as if this operation is not successful the appearance of the product is completely spoiled. The following will be found to be a good practical recipe:—

Ingredients.—2 lb. best glue.
2½ gallons of logwood liquor.
½ gallon cod oil.
¼ lb. beeswax.
½ lb. Venice turps or
¼ lb. boot finishers' heel-ball.

Method of Preparation.—The glue is soaked in the logwood liquor until soft, and dissolved by heating. The fatty materials are then dissolved in the heated cod oil, and the mixture added to the glue-logwood liquor, the whole being well stirred until cool. It is most important the top size should be of a uniform consistency, and it is advisable the final stirring should be carried out in a cool place if the size is to "set" properly.

Scar Paste.—This compound is used for covering up cuts scratches, warble marks, etc., on the grain side of skins.

Ingredients.—5 oz. gelatine.
40 fluid oz. cold water.
4 oz. extract of logwood.
¼ oz. bichromate of potash.
¼ oz. carbonate of potash.
⅛ oz. sulphate of potash.
2 quarts of water.

Method of Preparation.—Dissolve the gelatine in the cold water by first soaking it therein, and then gently heating it, and in the 2 quarts of water put all the other ingredients, and dissolve them by boiling the mixture, then mix this fluid with the gelatine solution, and stir until thoroughly mixed and it begins to congeal. When cold it should be of a jelly-like consistency. Moisten the damaged part of the skin, and then lay the scar paste on with a sponge.

Compounds for Preparing Enamelled and Patent Leathers.

Ingredients.—14 gallons linseed oil.
10 lb. white lead (dry powder).
10 lb. litharge (dry powder).

Method of Preparation.—Heat these ingredients together until the compound is reduced to the consistency of syrup, and then mix in chalk or yellow ochre. This compound is spread on the hide with a steel tool called a railike, the hide being stretched on a light framework of wood. The frames holding the hides are then placed on racks in a drying closet, with the coated side downwards. The drying closet is heated by steam pipes, and when all the frames are filled with the prepared hides the steam is set circulating through the pipes. The steam to each drier is controlled by a suitable valve, and when it is desired to admit the heat to the drier, the door is placed to the larger front opening, and the valve opened so as to give a temperature of about 80° F. to the interior of the drier, and from this point the heat is gradually increased to 160° F., which is about the greatest heat that the fibre of the leather will stand without injury. If it is desired to subject the leather to heat greater than 160°, the fibres are protected by saturating the leather with a solution compound of

2 oz. alum.
2 oz. borax.
1 gallon water.

The leather is immersed in the above compound for about two hours, and when nearly dry it is stretched in the usual manner on frames, and after japanning it is placed in the oven, as has been described, and the heat can be gradually increased from about 80° to 230° or 250° F.; the leather is kept in the driers for six to ten hours, or until the composition is completely matured and the surface perfectly dry; the borax prevents the recrystallisation of the alum. The next step consists in smoothing the surface of the ground mass by rubbing it with pumice stone; the ground mass is then coated three to five times with a compound of linseed oil and ivory-black, thinned with turpentine sufficient to allow it to flow evenly over the surface; the leather is dried after each application, and every layer but the last one is rubbed over with fine Tripoli powder or pumice stone applied with a piece of flannel.

Enamelling Compound for Patent Leather :—

Ingredients (No. 1).—10 lb. linseed oil.
5 lb. thick copal varnish.
½ lb. asphaltum.
10 lb. turpentine.

Method of Preparation.—The asphaltum can be replaced by an equal quantity of Prussian blue or ivory-black, according to the finish desired, the one giving a reddish and the other a blackish tint. The varnish should be kept in the finishing room fifteen to twenty days before being laid on the surface, and the air of the room kept damp and free from dust while the varnish coat is being laid on. The brush used is a long-haired one like a whitewash brush.

Varnish for Preparing Enamelled Leather :—

Ingredients (No. 2).—Boiled linseed oil.
Litharge.
Lamp-black.

Method of Preparation.—Boil the oil with the litharge in the proportion of 1 to 2 lb. per gallon of oil, and then mix in sufficient lamp-black to make the mass of the desired consistency.

A Finishing Coat is prepared from :—

Ingredients (No. 3).—12 parts shellac.
96 parts methylated spirits.
5 parts Venice turpentine.
2 parts gum sandarach.
1 part lamp-black.
4 parts turpentine.

Method of Preparation.—The solids are dissolved in the spirit, and the turpentine added last of all.

Japan for Patent Kid. First coat or daub :—

Ingredients.—10 gallons linseed oil.
3 lb. litharge.
1 lb. manganese borate.
6 oz. burnt umber.
1 lb. Prussian blue.

All the solid ingredients are finely ground and well mixed. The mixture is then added to the linseed oil. The whole is brought to a temperature of 500° F. and maintained at this temperature for six to eight hours. After cooling, it is again raised to 500° F. for a further four to eight hours, at the end of which time it is allowed to get quite cold. It may then be thinned down if necessary by the addition of not more than 3 gallons of petroleum benzine.

First Varnish :—

Ingredients.—10 gallons linseed oil.
5 lb. Prussian blue.
3 to 4 lb. vegetable black.

The Prussian blue is mixed with the linseed oil and then heated to 600° F. for twelve hours. At the end of that time the black is well stirred in.

Finish Varnish :—

Ingredients.—10 gallons linseed oil.
2 lb. Chinese blue.
2 lb. manganese borate.

These ingredients are well mixed and heated to 650° to 680° F. for twelve hours.

After a coating with the first daub has been given the goods are stoved, pumiced, brushed and given a coating of the first varnish. After stoving, they are pumiced again, brushed and coated with the finish varnish.

In many cases it will be found necessary to give two or even three coats of each individual varnish.

Tawing Compound for Glove Leather.—Ingredients for 100 medium-sized skins.

Ingredients.—	1½ lb. common salt.	Dissolved together.
	5½ lb. alum.	
	9 lb. boiling water.	
	14½ lb. wheat flour.	Make into paste.
	Cold water, q. s.	
	2 lb. egg yolk.	

Method of Preparation.—Make the flour paste in small portions with a gradual addition of water until it has become thinly fluid, then add 9 lb. more water to the paste, stirring constantly and vigorously, and finally mix it with the solution of alum and salt (which should be of a tepid temperature). The skins are then placed in a vat, and, after pouring the lukewarm paste over them, worked thoroughly with the hands to moisten them uniformly. Until recent years the penetration of the tawing mixture was effected by treading it into the skins with the bare feet, the workmen treading them vigorously for 1 to 1½ hours in a tub until the paste had been practically absorbed. In all modern works the process is now done in suitable drum tumblers such as have been described in the chapter on currying, special sizes suitable for the work being used. The process of treading is, however, still followed out in some of the smaller Continental works, where a very fine grade of tawed glove leather is required, but it is only a question of time when this archaic process will be only a memory. Suitable drums or tumblers are supplied by the leather trade engineers, although they are not difficult to make if a skilled carpenter is employed. The next step is to stretch the skins so as to free them from spots of adherent paste, and then hanging them up to dry quickly in an airy loft. Olive oil may be used instead of egg yolk. This gives also a very supple and soft leather, provided the workman understands how to divide the oil very finely, and to mix it naturally with the tawing paste. This is done by rubbing together in a mortar such as druggists use 36 oz. of wheat flour with sufficient water, or, better still, thin gum mucilage to form a stiff paste, add to this drop by drop and very gradually, and stirring constantly with the pestle, 10 oz. of the best olive oil, and rub the mass until a sample mixed with a little water separates no globules of fat after continued standing. The mass, the preparation of which is rather tedious, prepared in the above proportions, contains an equivalent of about 100 yolks of eggs, and is mixed with the tawing paste in the same manner. A still more perfect emulsion is prepared by stirring gum-arabic, finely pulverised, instead of wheat flour, into a thick paste with water, and adding to this the oil with constant stirring and rubbing; about 24 oz. of gum-arabic will suffice for 9 oz. of oil.

Substitute for Egg Yolk in Tawing Paste:—

Ingredients.—17 oz. fresh almond oil.
17 oz. fresh casein (curds of milk or cheese).
25 oz. dextrin.
1 oz. borax.

Method of Preparation.—Put the casein into a stoneware mortar, and having dissolved the borax in a little water, pour that over the casein; put the mortar in a warm place, and then rub the hot mass until the casein is almost dissolved and a tenacious liquid, drawing threads, is obtained. Next put in the dextrin, rubbing up the mixture until a uniform paste is obtained, then mix in the almond oil drop by drop, and continue the rubbing for about three-quarters of an hour, until the oil has become thoroughly mixed. The paste thus obtained is diluted with water by slowly adding same, and the previously prepared wheat flour kneaded with it. The above mixture answers as a substitute for 100 yolks of eggs.

Another Substitute for Egg Yolk is obtained by mixing calves' brains with wheat flour, ⅓ oz. of brain being considered an equivalent for 1 egg yolk. Olive oil can also be used as a substitute for egg yolk, 2 tablespoonfuls of oil being equivalent to 20 yolks of eggs. In such a case very intimate mixture of the yolk of egg with the oil must be effected by adding some flour, otherwise the leather will be spotted.

Tawing Paste for Danish Glove Leather consists of the following (for 12 doz. goat skins) :—

Ingredients.—4½ lb. alum.
2¼ lb. common salt.
13¼ lb. rye flour.
300 yolks of eggs or commercial egg yolk, q. s.

Method of Preparation.—Mix together and add birch-tar oil (q. s.) to give the characteristic odour of Russia leather.

CHAPTER V.

DYES AND STAINS FOR LEATHERS.

Before the introduction of the coal-tar dyes, the dyer had a very limited range of dye materials. He had, in fact, to depend on the dye-woods, mineral pigments, lakes, etc., consequently the variety of coloured leather was confined to but a few distinctive colours. By the aid of such materials, however, the dyer of those days produced coloured leather that was durable and good. Even when the aniline dyes were introduced, the dyer was handicapped in their use, because he found that such dyes did not always give the same resulting hue or colour; sometimes the dye used would yield light shades, sometimes dark ones, and sometimes the colour that resulted from the use of a particular dye liquor would vary according to the nature and tannage of the leather that had been subjected to its action. At the present time, however, leather dyeing by means of the aniline or coal-tar dyes has made vast strides, nevertheless there is still much to learn as regards the production of a particular colour by the aid of a particular coal-tar dye. One very important factor that determines the resulting colour is the strength of the dye liquor, while another very little less important factor is the temperature of the dye liquor at the time of use. When, again, various resulting shades are effected by the preliminary or subsequent treatment of the leather with mineral salts (mordant and topping agents), the exact nature and use of application of both dye and mordant or striker can be ascertained only by actual practice, as the nature of the tanning process to which the leather has been subjected greatly affects the colour produced. It is only in a limited range that definite instructions can be given, as the dye liquors which will produce a given colour on light leathers (sumach tanned skins) would produce totally different hues on bark or mineral tanned leathers, while in the case of tawed leathers (glove and chamois leathers) a still greater divergence is noticeable. It is only with the dye-wood liquor that fairly constant results can be obtained, owing to the fact that the coal-tar dyes very readily unite and colour organic tissues, the resultant colour being dependent on the strength of the dye liquor. It is advisable never to put the leather into a dye liquor of full strength, because those skins which were first put in would come out much deeper coloured than those last entered in the dye bath, simply because the energetic action in the first instance would have greatly exhausted the dye liquor and left it more or less weakened for the skins put in later on. The plan, therefore, which gives the best results is to prepare a series of dye baths, either of graduated strength or else all of a uniform strength. By this means uniform results are obtained with the aniline dyes. For example, have a series of three dye baths of equal strength numbered 1, 2 and 3. Put the requisite number of skins into No. 1 bath for the prescribed time, then into No. 2 bath, and finally into No. 3 bath. Now throw away No. 1 dye liquor, and prepare a fresh dye bath of the same strength as the others previously made, and call it No. 4; then with the next batch of skins put them first into No. 2 dye liquor, then into No. 3, and finally into No. 4 dye liquor; reject No. 2 dye liquor, and make a fresh bath, and call it No. 5; then for the third batch of skins first put them into No. 3, then into No. 4, and finally into No. 5 dye liquor; and afterwards reject No. 3 dye liquor, and prepare a fresh bath, and call it No. 6, which is continued in the same series *de novo*. By this method of working the skins are first put into a weak dye liquor, and lastly into a bath of new liquor which gives the finishing colour to the skin. A much more uniform coloration is obtained by this method of working than if a dye liquor of great strength were used direct. Some aniline dyes, if used of too great strength, give a bronze appearance.

The dyer should be careful to put in the skins at one plunge, otherwise those portions which first touch the dye liquor will show a deeper coloration than the portions that remain out longer, if even for a few seconds. By using a series of baths as above described, any unevenness of coloration is corrected in the subsequent or final bath, because by allowing the skins to remain a longer time in them, the skins will become uniformly coloured. After lifting the skins out of the final dye bath they should be washed in plenty of clean running water, so as to remove all superfluous dye liquor, and if any bronze hue appears lightly sponge the dyed side of the skin while rinsing under water. The drying of the dyed skin should be done in the shade (never in the sunlight, as that would cause the colour to fade) and in plenty of dry air. Finally, the dyed skin should have a coat of finish (egg albumen or some one of the finishing glosses mentioned in this chapter) laid on the dyed side; this will protect the colour from fading; any striker or topping agent should be applied before the dyed skin is quite dry, and before the finish is applied.

As every dyer knows, the process of staining leather is different to the dyeing of leather. In the latter case, both flesh and grain side of the skin become coloured. In dyeing skins tanned for morocco it is usual to put them into the dye liquor in pairs, flesh side to flesh side, but even this method does not prevent the flesh side becoming more or less coloured. It, however, effects a saving of dye liquor which would otherwise be used in dyeing the flesh side as deep as the grain. In staining leather, however, only one side, the grain side, is subjected to the action of the dye liquor. The *modus operandi* in *staining* leather is to lay the skin on a table (which has a marble or else hardwood top), neck part to the left hand; the table should be sloping and the skin smoothed out so as to prevent it slipping. Then a brushful (or spongeful) of the staining fluid is applied, going first straight down the middle of the back, then a second brushful applied rapidly round the sides, and finally a third brushful laid across from side to side, paying particular attention to distribute the dye liquor as evenly and rapidly as possible, then put the skin over the horse or trestle, and proceed with a second skin in the same way. When about a dozen skins have been thus treated, the skin first stained should be laid on the table, and given a second application of the staining fluid in just the same way, and so on through the dozen skins; if a third application of the dye is required, the operation is repeated *de novo*. If the skin requires mordanting before staining, it is best to have two operators at work, one to lay on the mordanting fluid and pass the skin to the dyer. The striker or topping agent should not be given until all the necessary coatings of stains are applied. Stained leather does not require to be rinsed with water, as it is the object of the stain to penetrate the fibre of the leather so as to give a well-nourished look; if not well filled with the dye liquor a hungry appearance is given to the stained side. In staining leather it should be the endeavour of the dyer to keep the flesh side of the skin as clean and free from stains as possible; a stained skin, clean on the flesh side, is always a more marketable article than one splashed with stain or otherwise disfigured by discoloration. To ensure cleanliness it is best to wipe the top of the table after applying the stain to a skin before laying a second skin on the table.

After the above explanation of the *modus operandi*, the following recipes and formulæ require no further explanation as to use. It should be mentioned, however, that the dye liquors, staining products, etc., should always be prepared in glazed earthenware or enamelled iron pans, as wooden ones are not suited because the dye liquor would penetrate the wood, and so render such vessel useless for holding a different dye liquor. The materials used in dyeing and staining leathers are:—

Acids for scouring the skins to enable them to take certain colours (*e.g.*, some aniline blues can be used only on an acid base, others on an alkaline one). The acids in use are sulphuric, acetic, oxalic, and formic.

Salts of metals (which are substances formed by combining an acid with a base), such as sulphates of iron, copper, aluminium, zinc, common alum, nitrates of iron and lead, chlorides of tin, acetates of iron, lead, copper and aluminium, bichromate of potash, ferrocyanide and ferricyanide of potash. Most of the above salts are used as mordanting liquids when dissolved in water, either alone or in combination; sometimes they are used as strikers or topping agents, that is, solutions of these salts are applied to the dyed leather so as to subdue or tone down its "fireiness," or strike the particular tone of colour desired.

Although attempts have of late years been made to substitute the chrome tannage for alum treatment, yet glove makers still prefer the alum leather for the finer grades of gloves. For the heavier varieties of gloves worn by motor drivers, teamsters, iron workers, etc., chrome leather has proved very suitable, as it stands heat and hard wear much better than the softer alum leather. In modern practice a combination of both methods is now often done. Machinery is also now used to facilitate the dyeing operations, and drums and paddles are freely used by the bigger leather manufacturers. Every glove leather maker follows out his own methods and formulæ, but one of the best résumés of glove leather dyeing and finishing which has been published of late years appeared in a prominent American journal, "The Shoe and Leather Reporter," which is well worth reprinting in full, as it gives the latest methods and working recipes for modern glove leathers.

It has already been mentioned that the various methods of tanning and dressing have a decided effect on the shades produced, so that it has been thought advisable by the writer to reproduce this excellent article in full.

Tanning and Colouring Glove Leathers.—The tanner who wants to make saleable glove leather from Cape sheep skins and goat skins will find the instructions given in this article of value. The result will be soft, tough, and durable leather that is uniformly and well coloured. If the sheep skins are received in the pickled condition they are taken in that condition and tanned in the alum and chrome process; if they are in the pelt form they are first soaked and fleshed, and then de-wooled and lime drenched, pickled and tanned. Some borax or caustic soda should be added to the water in which green-salted skins are soaked, to hasten the softening and cleansing. Dry skins are soaked in water containing 1 lb. of sodium bisulphite for 100 gallons of water in the vat; they are next run in a drum and soaked again until they are soft and clean. All flesh and dirt, burrs, etc., are removed, and the pelts are then drained well before they are painted with depilatory.

Use of Red Arsenic.—The use of red arsenic and lime is recommended for glove leather, since it makes fine, smooth grain and a soft skin. The proportion of red arsenic to lime is 8 lb. to each bushel of lime, the two being mixed together dry and slaked with hot water. The de-wooling paste is applied in the usual manner; the wool is removed the next day, and the slats are next limed in fresh, strong limes for several days or a week to ensure softness and elasticity and to dissolve the grease. The skins are next washed and bated with a good commercial bate, such as oropon or puerine. These processes are clean and pleasant to use, and there is no danger of injury to the goods. The quantity of dry bate to use must be determined by the amount of lime in the skins, and varies accordingly. The goods are turned from time to time, the temperature of the liquor being 100° F. at the start, and then left in overnight. The next morning the skins are found to be free from lime and in a soft and open condition. To get good clear grain that will colour evenly it is advisable to wash the skins after bating in warm water to which a small quantity of boric acid has been added. After this the skin should be pickled and tanned.

The Pickling Process.—For chrome glove leather, pickling is done in this manner: A stock liquor is prepared by dissolving 40 lb. of salt in 40 gallons of water, and adding 5 lb. of sulphuric acid to the brine. To pickle 100 lb. of skins 12 gallons of this pickle is used, the skins being drummed in the same fifteen or twenty minutes, then drained and tanned. When sheep skins are worked through the processes preparatory to tanning in the manner that has been described they are put into the best condition possible to be tanned and finished into soft, full, fine-grained glove leather, no matter whether the tannage be chrome, gambier, or alum. Pressing or wringing should be done next to remove the grease, and the skins are then in condition to be tanned.

One-Bath Process.—The one-bath process, that produces excellent, soft, full leather, consists of first tawing the skins with alum, salt, egg yolk, and flour, drying them, and then some time later wetting them back, and tanning them with one-bath chrome tanning material. The alum paste may be made by dissolving 2 lb. of alum and 2 lb. of salt in a little hot water for each dozen skins. Then two-thirds of a pint of egg yolk and 1 lb. of flour are mixed and stirred into warm water, the alum and salt liquor added, and the skins are drummed in the paste for two hours, left quiet some hours or overnight, then drummed a few minutes longer and hung up to dry. It is then best to keep the skins in the dry condition some time before chrome tanning them. When it is desired to tan them, wet them down with warm water, put them into a drum, and tan them with any good one-bath chrome tanning material.

Tanning with sulphate alumina is done in this manner: 3 lb. of sulphate of alumina, 2 lb. of salt, and 4 oz. of bicarbonate of soda are used as the preliminary solution. The alumina and salt are dissolved in 5 gallons of boiling water, and the soda, also in solution, is slowly stirred into the liquor. Cold water is then added to make 12 gallons of liquor, and the skins are run in it two hours, left in it overnight, and then hung up and dried thoroughly. After they have been in the dry or crust condition some time, the longer the better, the skins are washed back with warm water and chrome tanned. A good commercial chrome liquor, used according to the directions furnished by the manufacturers, is better than a liquor made in the tannery, unless the latter is made by a chemist and has been well tested out previously. Commercial fat-liquors, to which a paste of flour and water has been added, give the necessary softness and fullness that is desired in glove leather. The next process is colouring, which may be carried out at a temperature of 175° F., this temperature being necessary in order to impart a high degree of fastness to the dyeing.

Dyeing the Skins.—The dyeing of the skins is carried out best in a drum heated by steam. The anthracene yellows and chromate browns are especially suitable for this class of glove leather. The leather is thrown into the drum, and the solution of dye-stuff, at 120° F., and containing 1 per cent. of ammonia, is poured in, and the drum is run fifteen minutes. A solution of formic acid well diluted and bichromate of potash is then added to the liquor in the drum. The temperature is raised by steam to 170° F., and the goods are drummed at this temperature for fifteen minutes. Then the liquor is allowed to cool down to 120°, when 5 per cent. gambier in solution is added, and this is absorbed by the leather in another half-hour's drumming. Finally the skins are rinsed in warm water, set out, dried, and dressed in the customary manner, being run on a plush wheel to give the grain a nice, smooth, polished appearance.

Heavy skins are split after liming, and the fleshes are drenched, pickled, tanned, and coloured the same as unsplit or grain skins. Goat skins are limed in arsenic limes, and then bated and tanned in the same manner as sheep skins. The leather made according to the above-described process is soft, durable, and well coloured, and equal to any on the market. The writer knows this because he has used the process and sold the leather he made thereby.

Chamois Leather.—Chamois leather is so largely used by glove manufacturers that a few notes on the dyeing of such material may not be out of place. The goods must be carefully prepared for dyeing before satisfactory shades can be obtained; only those skins that have been sun-bleached can be dyed properly, those chemically bleached always throwing back in the dyeing process.

The first step in the dyeing consists of a good degreasing, and this is best accomplished by placing the goods in a bath of carbonate of soda, consisting of 2 lb. to 4 lb. of it for 100 lb. dry weight of skins, and drumming for half an hour at a temperature of 85° F. This operation must be carried out thoroughly, and should the first drumming not clear the skins entirely, another drumming must follow. The goods should then be rinsed in clear water, and mordanted with titanium salt or chrome alum.

For light shades, a good process is to run the skins first in a 2 per cent. bath of titanium salt, and then give them a bath of powdered sumach for thirty minutes. After this they must be well rinsed and freed from adhering sumach. Instead of this process, however, a bath of 2 per cent. of chrome alum can be given for twenty minutes, the goods being afterwards well boraxed. They are now ready for the dyeing, which can be done with wood dyes, acid or basic anilines, or with alizarine dye-stuffs, used either alone or in combination.

Following the above preparation for light shades, the dyeing can be accomplished by using about 2 lb. of acid colour for 100 lb. of leather. This must be dissolved in two or three gallons of water, and put into the drum in portions at intervals of five minutes, and the whole drumming continued for thirty minutes. It is necessary to add a quantity of bisulphate of soda equal to the weight of the dye-stuff to the dye bath towards the end of the dyeing, or, if preferred, in two portions, the first after fifteen minutes' drumming, and the rest soon after the whole of the dye-stuff has been added.

Colouring Glove Leather.—For glove-leather shades the mordanting should be somewhat different, and should be carried out by employing, after degreasing, a 2 per cent. solution of corichrome for twenty minutes, or the above-mentioned chrome alum solution, and then adding to the liquor the following crystal dye-stuffs in solution: fustic, 3 lb.; brazil, 1 lb.; logwood, ½ lb.; dissolved in four gallons of boiling water. Strain the solution, and pour it in at intervals through the feed-pipe. Darkening, if necessary, can be accomplished by using from 3 oz. up to 12 oz. of bichromate of potash. When dyed, the skins should be rinsed, and then given a light fat liquor containing egg yolk. A lighter shade can be produced by substituting Cuba-wood crystals for fustic, and reducing the quantity of logwood, etc. When dyeing with wood-dye crystals, the quantity of the same can be easily varied to produce different shades.

Colours so produced are of wonderful fastness. A top shading can be done by adding a little basic dye-stuff to the dye bath.

Beautiful shades of yellow and brown are obtained on chamois skins by drumming them with a solution of a coal-tar dye. The operation is carried out by first dissolving in boiling water 1 to 1½ parts by weight of sodium sulphide crystals to 1 part by weight of dye-stuffs. Then stir in the dye-stuff, and some olive oil soap, one-fifth the weight of the dye-stuff, and allow to cool. Shortly before entering the skins add some formaldehyde (formalin) one-tenth the weight of the dye-stuff. Dye the skins by kneading or drumming for thirty minutes in the cold solution; then rinse and give an after-treatment with a solution of 1½ oz. bichromate of potash, 1½ oz. sulphate of copper, 8 oz. acetic acid, per 10 gallons of water. After kneading for ten or fifteen minutes, rinse the skins, and wash in a soap solution containing 1 per cent. soap. Very soft leather is obtained by adding to the soap solution 1 1-3 to 1-2 oz. egg yolk for every skin. The various colours can be combined for the production of any current mode shade desired. By an after-treatment with bichromate of potash and copper sulphate the dyeings turn out somewhat darker and duller; the potash alone only slightly affects the shade. If the goods are to be dyed on one side only it is essential to apply the dye by means of the brush. For this purpose a solution is prepared which contains 1 lb. to 2 lb. of dye-stuff and the other above-mentioned ingredients per 10 gallons of water; this solution is brushed on to the dry leather until it has a good even appearance. The skins are then hung in the air for twenty minutes, after which they are brushed with a solution of 4½ oz. bichrome and 2 lb. acetic acid per 10 gallons of water; they are then rinsed well and washed with soap and egg yolk.

Colouring Alum Skins.—Alum-tawed skins are coloured and finished into glove stock, and also into leather, white or coloured, for various special and fancy purposes. The skins are taken in the pickled condition, and are tawed with sulphate of alumina, salt, egg yolk, olive oil, and flour. One hundred pounds of such skins can be tanned with 3 lb. of sulphate of alumina, 2 lb. of salt, 5 lb. of flour, 2 lb. egg yolk, and 1 lb. of olive oil. The flour is made into a paste with cold water. The sulphate of alumina and salt are dissolved in a few gallons of water, and to the solution 4 oz. of bicarbonate of soda are added, and then the egg yolk and olive oil are stirred in.

Finally, the flour paste is added, and the skins are drummed with the mixture two hours, left in overnight, and hung up to dry. When dry they should be left in a clean, dry room for some weeks before they are finished. They are then staked, buffed, and drummed with 1 lb. of egg yolk and 5 lb. of French chalk, set out, tacked, and dried. The goods can be finished white, or coloured any desired shade.

Tawing Liquor.—Where the skins are not pickled before they are tawed, the tawing liquor for twenty dozen skins should be made as follows: 18 lb. of alum and 20 lb. of salt are dissolved together in boiling water. Then six quarts of egg yolk and 20 lb. of flour are mixed together and placed in the drum with 20 gallons of warm water, and the drum is set in motion to insure thorough mixing. When well mixed, run in the alum and salt, and let the drum run five minutes before putting in the goods. After these are in they should be drummed for two hours, allowed to remain in the liquor a day or two, then taken out and dried.

After lying in the rough dry condition for some time, the skins should be moistened and staked and dried, and then allowed to remain unfinished for some time to fully mature. The first step in the actual colouring is the washing out of the tawing dressing. A prolonged washing is not necessary where wood-dye extracts in crystal form are used for colouring. It is usual to wash for one hour, using three waters at lukewarm temperature, and adding to the second water 2 to 3 per cent. of carbonate of ammonia. Another way of washing back is carried out by using a mixture of 7 oz. soda crystals, 7 oz. ammonia, and ½ oz. bicarbonate of potash for every dozen skirts, the goods being washed in tepid water, to which this solution has been added. A small drum is preferable for colouring, since it ensures uniform colours.

To dye 100 lb. of alum-tawed skins for glove or other purposes, use the following materials and procedure: The first bath should be one to which a solution of 1½ per cent. of bichromate of potash has been added to the water in the drum, and the skins are drummed in this solution twenty minutes. They should then be taken out and placed in a new bath consisting of 8 lb. to 12 lb. of gambier dissolved and prepared with sufficient water. Thirty minutes should be allowed for this bath, during which the skins will have taken on a nice yellow shade.

The following quantities of dyewood crystals are next dissolved in four gallons of boiling water and the solution allowed to cool: 1½ lb. Cuba wood, 1½ lb. fustic, 1½ lb. Brazil wood, and ½ oz. logwood. It is advisable to strain these solutions before using them. A part of this solution should at intervals of a few minutes be run into the drum containing the gambier, until the whole is run in. The goods should be examined occasionally to see if the shade is right.

The Dyeing Operation.—About an hour should be given for the dyeing operation, which is carried out at a temperature of 80° Fahr. Developing and fixing the colour follows, and this is best accomplished with titanium potassium oxalate, a few ounces of it being sufficient to darken the shade and fix the colour. Darkening can be done also by adding a small quantity of bichromate of potash or by using some basic aniline dye-stuff. If the latter is used, it can be dissolved in a small quantity of boiling water to which just a trace of acetic acid has been added, and portions of the solution poured into the drum until the desired shade is obtained.

To redress the leather after it is coloured some light fat-liquor, preferably egg yolk and a little salt, is required. The instructions that have been given for grain leather are equally applicable to suède leather. It may be necessary to augment the quantities of dyewoods just a little, also to drum for a longer time, otherwise the directions should be carried out as given.

Dyeing the grain of skins intended for kid gloves, and also the grain side of Cape sheep skins, a rich black may be done according to the following method. Brush the skin twice with a solution of 3 lb. of bicarbonate of ammonia per ten gallons of water, and then brush two or three times with the following solution: 2 lb. of logwood extract and similar quantity of quercitron extract made up to ten gallons of water. Striking the colour is accomplished by applying a solution of titanium potassium oxalate, 2 lb. in five gallons of water. The brushing may have to be repeated, the slicker being used between the brushings. The deepest possible shade is secured by a topping bath of basic aniline black given before the goods are fat-liquored or re-dressed. Where the grain side is brush dyed the flesh remains white, which is usually desirable for glove leather and other soft stock for special purposes. It is the usual practice to wash chrome skins immediately after they are coloured. It is practicable, however, to colour and dry first and then wash the leather. Where the washing after tanning is omitted, it is necessary to wash for two hours after the skins are dry, thus making them thoroughly clean. This procedure makes soft, full stock that has good colour. The skins are then dried again, dampened and staked, and when they are soft, well worked out and dry, they may be drummed with powdered soapstone, using six quarts of the same for two hundred or more skins. After they have been drummed in this way for an hour the skins are staked again, and are then ready for market. Running the grain on a plush wheel gives it a nice polish, and all roughness on the flesh side should be removed by buffing on an emery wheel. When finished, glove leather of any tannage should have a clean, smooth flesh, a uniformly coloured grain, the colour going through flesh and grain, and elasticity that will allow for stretching without showing a lighter shade underneath. Prolonged drumming in the colour bath usually accomplishes the penetration of the dye in a satisfactory manner.

Chrome Followed by Vegetable Tannage.—The reverse process of that one just described—that is, chrome tannage followed by vegetable tannage—is not often given. It is not as generally useful as the ordinary process of semi-chroming. This is partly because the goods which are to receive the combination tannage are, as a rule, already tanned by the vegetable process; for example, East India kips. Apart, however, altogether from this, the order chrome-vegetable is not as satisfactory as the order vegetable-chrome. This is not because the chrome-tanned goods will not absorb the vegetable tannin, but because the final leather is not as satisfactory as by the reverse process. Full-tanned chrome leather will absorb vegetable tannins with avidity; in fact, chrome leather will remove the tannin from a tan liquor much more rapidly than will raw pelt. (In the standard methods for the analysis of vegetable tanning materials, extracts and liquors, use is made of the properties which chrome-tanned leather has of rapidly removing the tannin. The infusion of the tanning material is shaken with hide powder which has previously been slightly chromed.) It is a characteristic property of both the alum tannage and the chrome tannage that the leather will rapidly absorb ordinary vegetable tannins. Even if the leather is as fully tanned as possible with the chrome tannage, it will still absorb large quantities of vegetable tannins. The reason why this order is not adopted in practice is because the final leather is not satisfactory. Instead of possessing the best characteristics of both classes of leather, which have been enumerated at the beginning of this article, and which it is the aim to incorporate in semi-chrome leather, the leather obtained by tanning first with chrome and then with vegetable possesses some of the worst characteristics. The most objectionable feature of leather produced in this way is the tenderness of the fibre.

CHAPTER VI.

NATURAL AND ANILINE DYE-STUFFS.

ALTHOUGH the modern aniline dyes have almost superseded the old-fashioned natural colouring matters, yet in a few special cases the latter are still favoured owing to the fastness of the shades produced. The following summary will give a few useful hints, which will be found advantageous to those who may be in a position to try the various materials mentioned:—

Annatto.—This colouring matter is obtained from the pulp surrounding the seeds of *Bixa orellana* by crushing. It can be cheaply and successfully employed for staining or dyeing, and is largely used in the Midlands for military work and the pig skin trade. It is not soluble in water, but is dissolved by adding a suitable alkali, such as borax or sodium carbonate, to the water and boiling.

For 1 lb. of annatto use 1 oz. of washing soda, or 2 grs. of borax, in one quart of water, and boil until all the colouring matter is extracted. It is also soluble in methylated spirit, and is generally bought in this form, although, of course, it is cheaper to make it. One pint of spirit or petrol will dissolve cold 1 lb. of annatto.

Annatto finds great favour with curriers, because, being either in an alkaline or spirit solution, it will stain greasy leather and produce level results. The well-known "London Colour" is practically always obtained by staining with a weak annatto solution.

It can also be usefully employed as a bottom in dyeing greasy or plain chrome leather, and can be used with the borax in the neutralising of the chrome after tanning, thus performing two operations at once—that is, dyeing and neutralising at the same time.

The only bad point about annatto is its fugitiveness, and goods stained with it alone will fade in colour in so short a time as seven days. A little of an acid yellow, such as tartrazine, should be mixed with it when used for staining.

Turmeric.—This belongs to the ginger family from Asia. The dried and ground rhizemes, or underground stems, are used.

It produces a bright yellow, which is improved by the addition of a small quantity of alum. It can also be used in conjunction with acid colours.

Care should be taken that the liquor is not alkaline, as the colour is changed to a reddish-brown, but has practically no dyeing power in this form. Unfortunately, turmeric is also fugitive to light.

Weld is another yellow colouring matter, but is not often used. Other yellow colouring matters are Persian berries, quercitron bark, young fustic, but have practically gone out of commerce.

Fustic, or old fustic, consists of the wood of *Morus tinctoria*, and is still largely used in admixture with logwood to produce a dead black, especially in chrome leather, in the proportion of one part of fustic to five parts of logwood.

Saffron, obtained from the flower *Crocus sativus*, is still used in the saddle trade for staining pig skins or hides, owing to its good levelling power.

Orchil Paste, Orchil Extract, and Cudbear are prepared from certain lichens by oxidising them in the presence of ammonia. It is a substantive colour, and can be employed in either a neutral, acid, or alkaline bath. It is still used for dyeing morocco for furniture work, producing a bluish-red shade, and is also very useful for "flaming in" or topping. It is not so fast to light or rubbing as a good many dyers think it is.

Brazilwood, Peachwood, and Limawood are obtained from various species of *Coisalpinia*, but have only a limited application to leather.

Sanderswood, Camwood, and Barwood.—The best of these is camwood, as it contains about three times as much colouring matter as either sanderswood or barwood. They are used for producing the fawn colour on chrome leather for ladies' uppers. Camwood gives the deepest and bluest shade, whilst barwood and sanderswood give yellower and brighter shades.

Cochineal is very seldom used by the leather dyer, owing to the fact that to produce a bright scarlet it is necessary to use stannous chloride in conjunction with it.

Catechu, or Cutch, is obtained from certain species of acacia growing in India, and is very useful for bottoming when browns are required, in that it dyes a level pale brown, and finds favour when skivers for hat-leathers are being dyed. They are first bottomed with the cutch, dyed with chrysoidine, and saddened with potassium bichromate, thus producing a very fast colour. It may also be used in the place of logwood in staining blacks, and, if anything, produces a better black.

Logwood is practically the only natural colouring matter which has not been replaced by aniline dyes. It consists of the heart wood of *Hæmatoxylin campechianum*, growing in Central America. It is met with in commerce in chips, extract, and hæmatin crystals, and the latter are more generally employed, both in dyeing and staining.

A little alkali is added to the hæmatin when dissolving it, when a better colour is observed. The goods are drummed in this solution for about an hour until it is exhausted, and a solution of copperas is run through the axle for a short time, when a bluish-black is produced. For a better black one-third of the weight of the logwood is taken of fustic, and it is advisable to add a little copper sulphate to the copperas, as by this means a black is produced which is faster to light than when it is omitted.

Logwood is also largely used for staining blacks, followed by an iron liquor. In all cases after the application of the iron liquor a good washing with water is essential, owing to the bad effect of excess of iron on leather.

Logwood can also be used for producing a pale brown when applied in a slightly acid solution, and is sometimes used in this form in obtaining the well-known London colour, being rendered slightly acid by the addition of a little acetic acid.

A good blue can be obtained with logwood if the leather be previously mordanted with alum and cream of tartar, washed lightly, and then dyed with logwood to which has been added a small quantity of chalk. A little bichromate of potash can advantageously be added to the alum bath, producing a faster colour.

Indigo.—This valuable colouring matter is obtained from the leaves of various species of *Indigofera*, and comes almost entirely from India. It possesses practically no direct dyeing power, but under the influence of reducing agents it is converted into indigo white, which is soluble in alkaline solutions, and after the goods have been immersed in this solution for some time, and allowed to oxidise in the air, indigo blue, or indigotin, is produced on the leather. By this means a fast blue is produced.

A much easier method for dyeing with indigo on leather is by treating it with concentrated sulphuric acid, thus producing indigotin-di-sulphonic acid, or indigo extract, which is soluble in water, and can be used in the same manner as an ordinary acid blue dye by the addition of a small quantity of acid. Leather dyed in this manner is not so fast as when the vat method is employed, and the only vat method applicable to leather is the hydrosulphite vat.

The hydrosulphite is made by allowing lime to act upon a concentrated solution of sodium hydrogen-sulphite (sodium bisulphite). The acid sodium hyposulphite produced reduces the indigo to indigo white.

When the vat is in continual use the liquor becomes strongly alkaline, and there is a danger of both the leather and the indigo being injured, and it is advisable to neutralise it by the addition of small quantities of hydrochloric acid. Sodium hydrosulphite is quite easily made, but the dyeing or reduction must be proceeded with straight away, as the hydrosulphite is very unstable, and liable to oxidation, and in this condition would not reduce the indigo.

Aniline Colours for Leather Dyeing:—

Aniline colours which are used for leather dyeing may be divided into three classes, viz.:—

Acid colours.
Basic colours.
Direct cotton colours.

To ascertain whether a given dye is an acid or a basic colour, a very good test is as follows:—

A little of the colour is dissolved in water and a little of a solution of tannin and sodium acetate added. In the case of a basic colour, a precipitate will be formed, while in the case of an acid colour, the solution will remain quite clear.

In very many cases, bought colours are merely a mixture of two or more dye-stuffs mixed in certain proportions to give a desired shade. Such mixtures can easily be distinguished from an ordinary single colour. A small quantity of the dye-stuff is placed on the point of a penknife and blown on to a piece of clean wet blotting-paper, when small coloured spots will be formed where the dye particles have settled. The various colours can then be observed.

Acid dye-stuffs are usually employed in conjunction with a small quantity of sulphuric acid, whereas in the case of the basic colours no such acid is required, but a small addition of acetic acid is generally made to counteract the hardness of the water used in the process. With some of the direct cotton colours, a useful addition is some neutral salt such as sodium sulphate, which helps in the deposition of the colour on the leather fibre in a more even state.

In pre-war days, the greater part of the aniline colours used for leather dyeing were of German manufacture, but it is pleasant to record that quite a number of reliable dyes have now been placed on the market by various British dye manufacturers. It is not too much to say that before very long, a larger range still of British dyes will be at the disposal of the leather dyer.

The following list will give the reader an idea of those dyes which are already on the market:—

Acid Colours:—

Acid phosphine R (Lev.)
Acid black VS (H.)
Acid leather brown 79487 (B.D.)
Acid leather brown 79186 (B.D.)
Acid orange G (B.D.)
Acid yellow 79210 (B.D.)
Acid scarlet 4R (H.)
Azo-acid cardinal B (H.)
Brilliant Bordeaux B (H.)
Carmoisine WS (Lev.)
Coomassie milling scarlet G (Lev.)
Coomassie violet AV (Lev.)
Coomassie blue-black (Lev.)
Cardinal red J (B.D.)
Cardinal red 3B (B.D).
Fast red A (Lev.)
Fast red EAS (Lev.)
Fast acid blue RH (B.D.)
Fast red A (H.)
Indulines 2B and 5B (Lev.)
Induline A (B.D.)
Leather brown 111N (Lev.)
Mono-chrome yellow G paste (H.)

Mono-chrome orange R paste (H.)
Nut browns D and Y (Lev.)
Naphthol green G (Lev.)
Nigrosine 7600 (Lev.)
Nigrosine G (B.D.)
Orange 11 (Lev.)
Orange 11 (H.)
Ponceau 2R (H.)
Soluble blue 2R (Lev.)
Scarlet R and 3R (B.D.)
Tan browns A and 2R (Lev.)
Toney red BD (B.D.)
Toney red 645 (H.)
Tartrazine (H.)
Vale yellow R (Lev.)

Basic Colours :—

Auramine O (B.D.)
Auramine O (H.)
Acridine yellow R (H.)
Brilliant phosphine L (Lev.)
Bismark brown 2R (Lev.)
Basic black 8467 (Lev.)
Bismarck brown R 100 (B.D.)
Basic green B conc. (H.)
Bismarck brown R conc. (H.)
Crystal yellow (Lev.)
Crystal orange (Lev.)
Chrysoidine Y (Lev.)
Chrysoidine YRP (B.D.)
Chrysoidine powders Y and R (H.)
Indine blue 2RD (Lev.)
Jute black G conc. (H.)
Methyl violet 10B (Lev.)
Methylene blue GS (Lev.)
Methylene green B paste (H.)
Marine blue H (H.)
Magenta powder (H.)
Magenta cryst. (B.D.)
Malachite green (B.D.)
Methylene blue 2B (B.D.)
Methyl violet 2B (B.D.)
Methylene blues BB, R, ZF (H.)
Phenylene brown PD conc. (H.)
Saffranine RFF (H.).

The following direct cotton colours will be found useful in the dyeing of chrome leathers :—

Dianol Colours (Lev.) :—

Fast pink BK, green BG, blue BH, black no. 1, fast yellow ARX, fast orange D, dark blue B.

Chlorazol Colours (B.D.) :—

Brown GR, fast yellow NX, green B, violet WBX.

In the above lists the makers' names are abbreviated as follows:—

(H.) L. B. Holliday Co., Ltd. (Lev.) Messrs. Levenstein, Ltd.
(B.D.) British Dyes, Ltd.

Dissolving Coal-tar Colours.—Solutions of coal-tar colours should always be filtered through a muslin or calico filter bag suspended over a clean wooden bucket, otherwise the undissolved particles in suspension will cause the leather to be spotted in places. A small quantity of acetic acid is added to the solution when dissolving the basic colours. In this latter case, hot, but not boiling water, should be used for making the solution. Condensed water from the boiler is very good for the purpose, provided it is free from iron.

Methods of Dyeing.—Dyeing with coal-tar or aniline colours may be carried out in three different ways, viz.:—

(1) In the drum.
(2) Paddle dyeing.
(3) Tray dyeing or dipping.

Drum Dyeing.—In this process, the skins previously prepared are put into a drum containing a convenient quantity of water at a temperature of 45° C. together with a little sulphuric acid. The drum is set in motion and the dye-stuff, previously dissolved in water, added in small quantities at a time through the hollow axle. By adding the dye in small quantities at a time, a more even colour is obtained. The dyeing is carried out for about three-quarters of an hour, at the end of which time the maximum shade will be obtained.

Paddle Dyeing.—In this method, a paddle is used, and has advantage over the drum method as the skins under operation can easily be observed by the dyer, which is not the case where a drum is used. The method is invariably used when the leather has to be dyed to a definite shade.

Tray Dyeing.—This method, now fast becoming obsolete, consists in dipping a pair of the skins to be dyed (held flesh to flesh) in and out of a dye bath. The method is laborious and has now been superseded by either the drum or paddle methods.

Chrome Leather Dyeing.—Before chrome leather can be dyed with coal-tar colours it has to be treated with a weak tannin solution, otherwise the colour will not be fixed by the leather. The only exception to this is when some of the direct cotton colours are used for the dyeing. These latter dye-stuffs have an affinity for chrome leather, which is not the case with the other classes of dyes. With the direct cotton colours a quantity of Glauber salts is added to the dye bath in order to regulate the deposition of the colour of the fibre and so produce an even shade.

Chrome leather is best dyed soon after tanning and neutralising, and before the leather is dried. The reason for this is because it is very difficult to thoroughly wet back chrome tanned leather after it has once been allowed to dry out.

The leather is first of all freed from any acid present by a short drumming in borax solution. It is then washed in warm water and dyed with the direct cotton colour. The quantity of dye necessary will vary according to the shade required. With the chlorazol colours from 1 to 2 per cent. of the dye can be used together with 20 per cent. of Glauber salts.

The shades produced are very intense and penetrate the leather well.

Staining.—Staining may be described as an operation by which the colouring solution is applied to the surface of the leather by means of a brush or other suitable medium. For some classes of leather, colouring is cheaper and more convenient than dyeing, as the amount of dyestuff used is considerably less and the operation can be carried out by unskilled workmen—boys and women often being employed for the work. Heavy dressed leather, such as stout split hides for accoutrements, travelling bags, portmanteaux, etc., are usually stained, the colour being applied carefully and evenly over the entire surface of the prepared hide.

It would serve no useful purpose here to give details of the primary dressing of this class of leather; it is usually carefully scoured or cleansed free of bloom and other impurities, slightly oiled, set out or well extended and dried slowly. It is then placed on a suitable table and the clear dye solution carefully applied with a brush. Experience alone is the only guide to obtain the best results, but the skilled workman knows just how much solution to apply, and when the desired shade is obtained. Often, in practice, two or even three coats are given of the weak solution, this giving much better results than attempting to use a strong solution, as this at once shows up the natural defects of the leather such as scratches, frized grain, barbed-wire marks, etc. It is often advisable also, after the first coat of solution is applied, to rub over the surface of the stained leather with the hand or a dry brush, as this serves to clear off dye particles which might smear later on.

As dyes vary greatly in strength, it is difficult to give actual formulae, but in practice it is usual to make stock solutions of 1 oz. of dye to the gallon of hot water, using the solution when cold. Before the actual staining, however, takes place, it is always advisable to work out the shade on small scraps of the leather, as this will assist matters materially.

It is often found advisable also to tone or "sadden" down aniline colours, and for this purpose the leather is brushed over either before or after staining with a weak solution of bichromate of potash, copper sulphate ("bluestone") or iron sulphate ("copperas"). These chemicals in solution will also help to clear the leather in addition to toning down the shade, but they must in all cases be used with care as the grain of the leather will suffer.

Some stainers also favour the use of certain mucilages in their stains, although in the writer's opinion these are best left until the desired shade is obtained. In practice, it is usual after staining to apply a weak solution of such materials as linseed decoction, Irish moss, gum tragasol, blandola, gum tragacanth, etc., decoctions. The materials are boiled until the mucilage is extracted and the solution strained and cooled, a little of the dye being usually added to assist in building up the desired colour. Embossing, rolling, glazing or glassing are also processes which are often necessary for certain leathers, most of these operations now being done with machinery on a large scale.

Some of the commoner sorts of leather for such purposes as boot linings are also stained where cheapness is a consideration; tanned sheep skins (known as basils) are stained in thousands in the boot manufacturing centres, and are used for lining boots and shoes. The cost is very little, and where fastness of shade is not a necessity the staining process answers the purpose quite well. Australian and New Zealand basils are often used for this purpose, and after striking out in the wet condition, straining on boards to dry, they are stained and "topped" with some form of mucilage, and are then ready for the shoe manufacturer to cut into cheap boot linings.

General Remarks.—For many books of this class it is usual for the authors to furnish various recipes; many of these are obsolete, and in many cases absurd, as the materials are now unobtainable. As loss and trouble may ensue by an attempt to work along old lines, the writer advises readers to purchase small quantities of the dyes and materials mentioned, and to work out their own formulæ on the lines suggested. British firms who supply aniline dyes will usually submit samples, and in many cases furnish directions for their use. The essential things to remember in connection with leather staining are to thoroughly dissolve the dyes, to strain them carefully in solution, and not to attempt to use them in too great strength. Some dye solutions, again, precipitate on standing, and this is also an important point in deciding on the use of suitable dyes on a large scale.

Dyeing Wool Skins.—The following is the method for dyeing the wool on the skin for mats, rugs, etc. The skin is fastened to a framework of wood by means of hooks or pegs projecting from the edges of the frame. This frame is capable of being stretched in both directions, length and breadth, by a suitable arrangement of screws in the centre of the frame on the reverse side to that on which the skin is fixed. The flesh side of the skin is next to the frame, so as to permit the wool to be exposed. This frame fits on ledges fixed round the sides of rectangular copper pans, and the stretching frame is attached to a pulley so that it can be raised vertically out of the pan when desired. By this arrangement the depth of wool that is in contact with the dye liquor can be regulated at will. In an American apparatus for dyeing skins with the wool or hair on, the skin to be dyed is first sewed to a cloth and then hooked on to the points or pegs of the stretching frame above, and fastened to the frame is a box-like structure which permits air to be passed into it. When all is ready for dyeing, the air is forced into the air chamber, the wool is lowered into the dye liquor, and raised a few times until sufficiently coloured, after which it is removed. By means of the air admitted to the skin, the latter is always kept cool and prevented from injury by coming in contact with the hot steam of the dye liquor, so that it is not necessary to remove the skin from the dye vat until the wool is dyed. By the escape of the air without coming in contact with the dye liquor, no trouble arises in consequence of cooling the liquor. This method of dyeing is necessary in the ordinary dyeing processes in order to prevent the skin from being injured by being too long in contact with the heat from the dye liquor, as the wool will not bear too great a heat, and the skin to which it is attached would be shrivelled up if subjected to too great a heat—the heat of boiling water in fact.

After removal from the dye liquor the skins are rinsed, dried, moistened with salt water, and stretched. If patterns are desired on the wool, a copper model is used, shaped to the pattern desired, having a ledge about 1 inch high running round the edges of the model; this pattern is placed over the wool it is desired to protect from the action of the dye, the wool being gathered up and enclosed in the pattern by means of the round edges; the model is strapped on the wool side of the skin, and as a consequence all the wool that is gathered up under the pattern is not subjected to the action of the dye liquor, as it does not come in contact with the dye. A temperature of 130° F. should not be exceeded in dyeing sheep skins for rugs or mats.

Dyeing and Colouring Skins with the Hair or Fur on.—The following processes will enable any kind of pelt to be coloured as desired :—

To Colour Furs :—

Method of Use.—Soak in soft water, then wash in middling strong soda and water, and rinse clean. Afterwards apply with a brush, and well rub through the fur down to the pelt ½ an oz. of crystallised nitrate of silver dissolved in 1 pint of soft water, and hang in the sun to dry. Again apply with a brush, and rub well through the fur ½ oz. sulphate of potash dissolved in 1 pint of soft water, and hang in the sun to dry. When dry rinse off, and hang in the shade to dry, and work occasionally while drying.

The following is Bugh's method for *Tanning and Colouring Beaver, Otter,* or any other skin with the hair or fur on :—

Method of Use.—Soak the skins (if dry) for twelve to sixteen hours, then flesh them, and again soak six to eight hours longer, then wash them as follows : Take sufficient warm soft water, to which add soda until the water feels slippery, then wash thoroughly ; next wash them well in warm strong soap suds, then rinse well through two or three waters, and wring out as dry as possible. The skins are then ready for the tan liquor, which is prepared as follows :—

Ingredients.—2 gallons cold soft water.
2 lb. Glauber's salt.
1 lb. alum.
1 lb. common salt.
½ oz. sulphate of zinc.

Method of Use.—Dissolve 1 lb. gambier in ½ gallon of the above preparation over a slow fire, then mix all together. All the ingredients should be pulverised so as to dissolve more quickly. Place the skins in the tan, and handle by pulling and stretching thoroughly, and let remain two or three days—if hairy furs, such as seal skins, four to five days—then rinse in three or four clean waters, wring out as dry as possible, and hang in the shade to dry. When nearly dry work them occasionally by stretching on the beam with the fleshing knife. When dry finish on the beam by working the middle or thick parts of the skin down until it is even, or as thin as the edges or flanks. A currying knife with a fine edge is the best tool to do this with, or it may be done with coarse sandpaper rolled on a round stick, using it the same as a knife. If it is desired to pluck the hides, wash them thoroughly in alkali, and rinse them in clear cold water for a day or two longer, or until the "guard hairs" pull out without breaking. Care must be taken not to let the skin touch it; if it does it will loosen the fur, as the fur is only on the grain side, while the "guard hairs" go through into the pelt.

To Dye Rabbit Skins Black :—

1st bath—carbonate of soda, 10 lb.
2nd bath—17 lb. extract of logwood.
10 lb. cutch.
2 lb. sulphate of copper.

Method of Use.—Put the skins first in the carbonate of soda solution, rinse them, and then put them for two hours in the second bath before the sulphate of copper is added. During this operation keep the temperature of the bath at 85° F., then take out the skins, cool off, and replace them in the bath, which should be heated to 95° F., and repeat this operation after the copper sulphate has been added, increasing the temperature every time 10° F. up to 120° F., then thoroughly rinse the skins.

MISCELLANEOUS RECIPES.

Black Lacquers :—

Ingredients (No. 1).—50 parts turpentine.
400 parts spirits of wine.
50 parts shellac.
20 parts extract of logwood.
6 parts bichromate of potash.

Method of Preparation.—Dissolve the logwood extract in the spirits, then add the potassic salt, and lastly dissolve the shellac in the spirits, and add the turpentine last of all. If a blue-black hue is desired dissolve 1·75 to 3·5 parts of indigo carmine in the ready-made lacquer.

Ingredients (No. 2).—7½ pints spirits of wine.
5 oz. spirit soluble black.
30 oz. ruby shellac.
1 oz. Venice turpentine.
1 oz. gum sandarach.
1 oz. castor oil.

Method of Preparation.—Dissolve the aniline black in the spirits, then dissolve the shellac and sandarach, and when they are dissolved put in the Venice turpentine and the castor oil. The presence of the castor oil renders the lacquer flexible, and prevents it being brittle.

Ingredients (No. 3):—

(*a*) 10 parts water.
2 parts borax.
2 parts shellac.
(*b*) 2 parts logwood.
2 parts water.
(*c*) 1 part green vitriol.
1½ parts water.

Method of Preparation.—Make these separate mixtures, then dissolve the shellac in the water by aid of the borax in (*a*). Separately boil the logwood in the water (*b*) and filter, lastly dissolve the green vitriol in the water (*c*), then mix (*a*) and (*b*), and finally pour in (*c*). This lacquer is not waterproof, but it can be polished by brushing or passing a hot polishing iron over it.

Ingredients (No. 4).—1 part black pitch.
4 parts benzol.
Turpentine, 10 per cent.

Method of Preparation.—Dissolve the pitch in the benzol, being careful not to have a naked light in the room.

Ingredients (No. 5).—100 parts methylated spirits.
20 parts shellac.
5 parts gum sandarach.
2 parts gum mastic.
5 parts colophony.
5 parts Venice turpentine.
1 part lamp-black.

Method of Preparation.—Digest at a gentle heat, and well mix by shaking. This is a good lacquer for harness makers.

Bronze Coloured Lacquer for Shoes and Morocco Leather.

Ingredients.—1·1 lb. shellac.
2·8 oz. aniline blue.
4·4 lb. water.
8 oz. borax.

Method of Preparation.—Dissolve the aniline dye in the water, then put in the borax and boil, and while boiling stir in the shellac, and continue the boiling until the shellac has dissolved.

India-rubber Varnish for Leather :—

Method of Preparation.—Mix together at a suitable heat equal bulks of caoutchouc varnish and soluble copal varnish.

Finishes for Preserving Aniline Dyes on Skins :—

No. 1.—180 grammes gum-arabic in 2 litres of water.

No. 2.—180 grains shellac dissolved in 2 litres spirits of wine.

No. 3.—Add 120 grains of liquid ammonia to 3 litres of water heated to 75° C., and then dissolve in the solution 90 grains of caseine, stir the mixture until the boiling-point is reached, then allow to cool, and pour off the clear fluid. For use these fluids are applied to the dyed skins when they are dry, so as to prevent the colour fading.

A softening dressing for aniline dyed skins is made by mixing 10 grammes of yolk of egg and 5 c.c. of glycerine in 1 litre of water. Rub the skin with this mixture, let it half dry, and then rub it well with a piece of woollen rag only. In finishing the skins after dyeing, dry them on the stretching frame so as to prevent shrinking. While drying at intervals well shake the skins so as to open up the fibre and prevent matting of the fibre taking place. When dry the fibre side should be well brushed to separate the fibres as much as possible, and to soften the skins they may be rubbed on the flesh side with a little oil or a mixture of oil and the yolk of egg. Cod oil and castor oil are better than any other oil for softening the skins. As a preservative a little mercury chloride added to the oil will be best; 1 oz. will be sufficient to add to 3 gallons of oil.

Transparent Leather is obtained thus: The skins are depilated, cleansed and stretched on frames, and then a mixture rubbed into them composed of the following:—

Ingredients.—1000 parts glycerine.
2 parts salicylic acid.
2 parts picric acid.
25 parts boracic acid.

Method of Preparation.—Before the skins are properly dry put them into a chamber sheltered from the sun, and then a solution of bichromate of potash is applied to them when they are thoroughly dry. The skins are then covered with a solution of shellac in spirits of wine.

Cement for Leather or Rubber:—

Ingredients.—1 lb. gutta-percha.
¼ lb. india-rubber.
2 oz. pitch.
1 oz. shellac.
2 oz. linseed oil.

Method of Preparation.—Melt together by heating and use hot.

Waterproof Composition for Boots and Shoes :—

Ingredients.—4 oz. spermaceti wax.
1 oz. india-rubber solution.
10 oz. tallow or lard.
5 oz. copal varnish.

Method of Preparation.—Melt the spermaceti in the rubber solution, then put in the tallow or lard, and lastly the copal varnish. This compound is applied on the leather with a brush, and if applied to the soles of boots (warmed) the leather is rendered waterproof and more durable.

Glycerine Polish for Leather :—

Ingredients.—3 lb. lamp-black.
½ lb. bone-black.
5 lb. glycerine.
5 lb. syrup.
2¾ lb. gutta-percha.
10 oz. olive oil.
1 oz. stearine.
5 oz. gum-arabic (dissolved in 24 oz. water).
½ oz. oil of lavender.

Method of Preparation.—Mix the blacks with the glycerine and syrup, separately melt the gutta-percha until it flows easily, then add the oil to it ; when well mixed put in the stearine ; while this solution is warm mix it with the glycerine compound, then put in the gum mucilage, and lastly the essential oil to perfume it. Dilute with three or four times its volume of water for use.

Dressing Wool Rugs :—

The skins must first be washed or soaked very carefully in a clean fresh water. An old soak must be avoided, because it would tend to loosen the hair, particularly in summer. Place the skins over a horse and wash the wool very thoroughly with soap, finally rinsing with water.

Make up a homogeneous paste of:—

Alum	2 parts.
Salt	2 parts.
Rye flour	1 part.

Place a layer of this mixture on the flesh, fold the skin in two, flesh to flesh, and lay in pile. On top of the pile place weighted boards, and leave for two days to allow the cure to penetrate.

After two days open out and give another similar coating; lay in pile, and leave for two days as before. The skins should then be completely penetrated by the mixture. Wash them quickly in cold water to remove the excess of material, and allow to dry out slowly.

In the above state the skins may be kept as long as desired, for they will only improve in quality. When they are to be finished, damp them lightly and stake them twice. Finally, if necessary, pumice them or treat them with the moon knife, and comb the wool carefully. This process may be applied to all sorts of fur skins, but those which possess loose flesh should have it removed before applying the tanning mixture.

To Prepare a Sheepskin for Mats:—

Method of Preparation.—Make a strong lather with soap and hot water, and let it stand until cold, wash the fresh skin in it, carefully squeezing out all the oil and dirt from the wool, wash it in cold water until all the soap is taken out. Let it soak for twelve hours, and hang it over a pole and drain. When well drained stretch it carefully over a board frame to dry, and repeat the stretching several times while drying. Before it is quite dry sprinkle on the flesh side 1 oz. of alum and 1 oz. of saltpetre, rubbing them well into the flesh. Try the wool to see if it be firm on the flesh; if not let the mixture remain a day or two, and then rub again with alum, fold the flesh side together, and hang in the shade for two or three days, turning it over each day until quite dry. Scrape the flesh side with a blunt-edged knife, then rub with pumice stone or rotten stone (Tripoli powder). Fur skins are tanned by first removing all of the useless parts and softening the skin by soaking in cold water, then remove the fatty matter from the flesh, and soak in warm water for half an hour. Next mix equal parts of

Borax,
Saltpetre,
Sulphate of soda,

in sufficient water to make a thin paste, spread this with a brush over each skin, applying more to the thicker parts than to the thinner. Double the skins together, flesh side inwards, and put in a cool place. After remaining for twenty-four hours wash the skins clean and apply in the same manner as before a mixture of

1 oz. of common washing soda,
½ oz. borax,
2 oz. white hard soap,

melted slowly together without being allowed to boil, fold together, and put in a warm place for twenty-four hours. After this dissolve

4 oz. alum,
8 oz. salt,
2 oz. cream of tartar,

in sufficient rain-water to saturate the skin; when cool enough not to scald the hands, soak the skin in it for twelve hours, then wring out and hang up to dry. When dry repeat the soaking and drying two or three times until the skin is sufficiently soft. Lastly smooth the flesh side with sand-paper or pumice stone.

Cements for Leathers :—

No. 1.—Soak equal parts of glue and isinglass in water for ten hours, pour off superfluous water, and then gradually melt them by slowly heating, and mix in tannic acid until the mass becomes ropy or coagulated like the white of an egg. To use the cement roughen the surface of the leather to be joined, put a layer of cement on this hot and clamp firmly.

No. 2.—Mix 10 parts of bisulphide of carbon with 1 part of turpentine, and then add sufficient gutta-percha to make a tough thickly flowing fluid. Before using this cement free the surface to be joined from grease. To effect this sprinkle a little bicarbonate of soda, carbonate of ammonia, or borax on the surface to be joined, lay a cloth over them, and then place a hot iron on top, and keep it there a short time so as to cause the alkali to cut the grease, then put the cement on both surfaces to be joined, put them together and then subject to pressure until they are cemented.

No. 3.—Gutta-percha dissolved in bisulphide of carbon to the consistency of syrup is also a good cement for joining leather. The parts to be joined should be well covered with cement so as to fill the pores of the leather, then the cement is heated, and the parts hammered until the cement is cold.

No. 4.—*To join Leather to Metal* with hot solution, steep the leather in an infusion of nut galls (hot), and bring the two together.

Ingredients (No. 5).—16 oz. gutta-percha.
4 oz. india-rubber.
2 oz. pitch.
1 oz. shellac.
2 oz. linseed oil.

Method of Preparation.—Heated together, remelt for use.

No. 6.—*To join Leather to Metal* :—

Method of Preparation.—Melt together equal parts of asphalt and gutta-percha, and apply hot under pressure.

No. 7.—*To join Leather to Pasteboard* :—

Method of Preparation.—Dissolve 50 parts of strong glue with a little water at a gentle heat, then add a little Venice turpentine, and next a thick paste made with 100 parts of starch in water; apply quickly when cold.

Another Formula for a similar cement is this :—

Ingredients.—1 pint methylated spirits.
1 pint water.
4¼ oz. powdered starch.
1¼ oz. good glue.
1¼ oz. Venice turpentine.

Method of Preparation.—Mix the spirits and water together, then stir in the starch and make a thick paste. Separately dissolve the glue in an equal weight of water, and mix the Venice turpentine therein, mix thoroughly, and then compound this mixture with the thick paste by constantly stirring until all is well incorporated.

Black Kid Reviver :—

Ingredients (No. 1).—4 parts logwood.
½ part sulphate of iron.
40 parts water.

Method of Preparation.—Boil for half an hour and then strain into tragacanth powdered ($\frac{1}{14}$th part) 1 part soap and 3 parts glycerine. Add 1 fluid pint methylated spirits containing ¼ pint salicylic acid, 4 minims oil of gaultheria, and add water to make 40 fluid pints.

Ingredients (No. 2).—40 oz. vinegar.
1 oz. iron filings.
1 oz. sulphate of iron.
1 oz. logwood.
3 oz. bruised galls.

To Preserve Egg Yolk :—

Ingredients.—1 lb. egg yolk.
¼ oz. common salt.
¾ oz. starch.

Method of Preparation.—Rub up together in a mortar, and when the mixture thickens pour it into moulds and dry in the air. This dried yolk answers as well as fresh.

To Protect Furs against Moths and Insects :—

Method.—For 100 small skins use with the tawing liquor a mixture of

¼ pint turpentine.
¼ pint weak solution of carbonate of soda.
1 pint concentrated decoction of wormwood.

The usual tanning method is followed. For larger skins (*e.g.* sheepskins) take

2 lb. turpentine,
4 lb. soda lye.
8 lb. wormwood decoction.

To Imitate Sable Skin prepare a mordant of

1 part quicklime.
10 parts water.

Method of Use.—Apply this with a brush to the fur side of the skin, and allow to remain for twelve hours, then dye the skin in the following preparation :—

Pulverise and mix :—

3 lb. roasted gall nuts.
¼ lb. sal ammonia.
15 lb. sumach.
13 lb. sulphide of antimony.
2 lb. verdigris.
10 lb. iron scales.
4 lb. copper ash.
10 lb. clay.
12 gallons water.

Method of Use.—Mix well and apply a layer of this to the skins, and after twenty-four hours place every two skins with the fur side together, let them lie for twenty-four hours, and then beat them. Repeat the whole process until the desired colour is obtained. Finally clean the skins by putting them in the tumbling wheel or drum filled with sand and mahogany sawdust.

Decorative Gilding on Leather.—Gold leaf, silver and other bronzing powders may be affixed on leather by the following process:—

Free the tanned leather from all fatty bodies by soaking it in a warm bath of borax for a time according to its thickness, then take it out, rinse and dry it; afterwards saturate it with a solution of isinglass and alum. Dry it in the air, and then give it one or two coats of a mixture of—

2 lb. collodion.
1 drachm castor oil.

Dry again and then brush with a weak solution of caoutchouc in benzol. Then apply the gilding varnish, which is prepared from old linseed oil varnish boiled with litharge and Venice turpentine. When the varnish is dry so that it is only slightly sticky, lay on the gold leaf or bronzing powder with a brush, and finally give a coat of mastic resin dissolved in alcohol.

To Harden Hemlock Tanned Sole Leather prepare as below:—

8 oz. slaked lime.
2 lb. sal soda.
½ gallon water.

Boil together, cool, and add—

8 oz. slaked lime.
½ gallon water.

Steep the leather in this for three days, then lift out and put into a bath of

3 lb. slaked lime,
1½ gallons water,

and let it soak in this for from two days in summer to three or four days in winter. When taken out of this pass through water heated to about 180° F., and then press between heavily weighted rolls, or if a denser material is required press by hydraulic pressure.

To Renovate Black Suede Shoes, etc.:—

Method of Preparation.—Wet the surface well with alum water, and when nearly dry brush with a decoction of logwood boiled and filtered, to which is added a little acetate of iron.

Renovating Paste for Patent and Enamelled Leathers:—

Method of Preparation.—Melt pure wax and put in some olive oil, and then a little lard, and mix over a gentle heat, then put in some oil of turpentine, and finally a few drops of oil of lavender. Apply this paste with a rag, and polish by rubbing with a soft cloth or piece of flannel free from fluff.

Edge Stain for Black Harness:—

Ingredients.—1 gallon water.
½ lb. logwood extract.

Method of Preparation.—Boil until the extract is dissolved then put in

8 oz. sulphate of iron,
½ oz. gum-arabic,
½ oz. bichromate of potash,

and shake up well for use.

To render Sole Leather Waterproof:—

Method of Preparation.—Warm the leather and then give a coat of copal varnish, and repeat the operation until the leather is saturated.

White Bottom Wash for Sole Leather :—

Ingredients.—4 oz. borax.
4 oz oxalic acid.
1 gallon water.

Do not let the acid predominate.

Method of Use.—For use, sandpaper the sole of the boot, then wet it with the above fluid, and when nearly dry dust with French chalk, pipeclay, or bottom ball in the usual way. A little turmeric root or Chinese yellow may be mixed with the fluid to produce a yellow tone. Or a buff bottom ball may be used.

White Bottom Finish :—

Ingredients (No. 1).—40 oz. French chalk.
3 oz. yellow ochre.

Method of Preparation.—Mix in water to make a paste, then reduce with 1 gallon water made sky-blue with common laundry blue, ½ oz. saturated solution of oxalic acid, and ½ gallon thin gum tragacanth mucilage. Give two coats, allowing the first to dry before laying on the second.

Ingredients (No. 2).—16 oz. French chalk.
8 oz. common chalk.
8 oz. meth. spirit.
¾ gallon water.
¼ oz. dissolved oxalic acid.
Gum tragacanth mucilage, q. s.

To Clean Furs :—

Dark.—Make a lot of new bran hot in a suitable pan, being careful that it does not burn, and when well heated rub thoroughly into the fur, and repeat two or three times. Shake the fur and brush briskly until free from dust.

Light.—Lay the fur on a table, and rub it with bran moistened with water. Rub until dry, then rub with dry bran. Use flannel for rubbing with the wet bran, and book muslin for the dry. After using the bran rub with magnesia. Dry flour may be used instead of wet bran. Rub against the way of the fur.

Glove Cleaner :—

Ingredients.—3 oz. white Castile soap.
2 fluid oz. javelle water.
2 fluid oz. water.
1 drachm liquid ammonia.

Method of Preparation.—Dissolve the soap in the water by the aid of heat, and when nearly cold add the javelle water and ammonia, so as to make a paste. For use rub this paste on the glove with a piece of flannel, the glove being stretched on the hand or a wooden glove hand.

To Clean Wash Leather or Doeskin :—

Wash the leathers in lukewarm soft water with a little Castile or curd soap, ox gall or bran tea, then stretch over a wooden hand, or pull them into shape without wringing them. Next rub them with pipeclay, yellow ochre or water, or a mixture of this, in any proportion to suit the shade, made into a paste with ale or beer. Let them dry gradually, and when about half dry rub them well so as to smooth them and put them into shape. When they are dry brush out the superfluous colour, cover them with paper, and smooth them with a warm (not hot) iron.

Another process is to rub into the leather a mixture of finely powdered fuller's earth and alum, sweep it off with a brush, sprinkle this with a mixture of dry bran and whiting and lastly dust this off well.

A Grease Extractor for Leather is benzine. Nothing better dissolves out grease than this fluid, and by solution carries off the grease. The fluid is very volatile and inflammable, and should not be used in a room where there is a naked light or fire, and to use the fluid the article to be degreased should be steeped in the benzine in a covered vessel, for some time and then taken out and exposed to the air. Alkaline grease extractors often prove injurious to leather.

Wool Washing Compound:—

Mix together—

1 part dry powdered soap.
1 part carbonate of ammonia.
3½ parts soda crystals.

Method of Preparation.—Mix together and make into a lye with warm water for use.

Mordant used in Dyeing Russia Leather:—

Method of Preparation.—Make ¾ oz. of nitric acid hot, and then pour into it 18 oz. of salt of tin (*i.e.*, tin salt or stannous chloride), stir this mixture while adding the tin salt, and make it in the open air so as to avoid inhaling the fumes that are given off. Stir carefully so as to allow these poisonous fumes to escape, and when the mixture begins to whiten add 4½ oz. of fuming hydrochloric acid, and stir carefully for a few minutes. When the mixture is cool put it up in well-stoppered bottles. For use dilute with twelve to fifteen times its own weight of pure water. This mordant is applied to the leather very briskly and uniformly with a brush, and the colouring matter to use on Russia is 18 oz. sandal-wood boiled for one hour in 1⅝ gallons of pure water, the liquor filtered and 1 oz. of prepared tartar and soda dissolved in it. Then the mixture is boiled for one hour, and left to rest a few days before using it. The sides destined for black dyeing are only oiled on the flesh side, which must be dried with a woollen rag, leaving the grain half moist and irreproachably neat. Then two or three applications of the above mordant is given, and then several applications of the warm dye, the temperature of which is raised if necessary (*i.e.*, the dye must only be applied while warm), and if the operation takes too much time, according to the number of skins, the dye must be kept at the proper temperature. The application of the mordant and dye is done with a brush by rapidly spreading the liquid which is poured on the leather. The first application of the dye is made immediately after the mordant, and while the leather still retains some of the moisture. After dyeing the leather must be slightly moistened on the flesh side with tan solution, and dried and then grained. The odour of Russia leather is imparted by means of birch tar oil being mixed with this tan liquor. For a brilliant gloss on the leather a coating of gum dragon mucilage, not too strong nor too weak, is laid on with a sponge.

The dyeing of Russia leather by means of aniline dyes is accomplished by using 1 part of Russia leather red G, B, or R in 100 parts of water. This solution is mixed with more or less water for dyeing, and the first application is a very weak solution, the next one is stronger, and the last application of dye liquor a very concentrated solution.

For yellow and brownish shades 1 part of phosphine in 500 parts of water is used, the bright colour of which may be subdued by giving an application of bichromate of potash solution to the dyed skin. The mordant to use with the aniline dyes in colouring Russia leather is phosphate of soda alone, or with a little dextrine, or else sulphate of soda (Glauber's salt). These levellers produce a uniform coloration.

To Cure Light Skins with the hair or fur on:—

1 bushel wheat bran.
12 gallons water (hot).

Method of Preparation.—Let this stand in a warm room, and stir it until the mixture ferments, then strain out the liquid and dissolve therein—

4 lb. salt.
1½ lb. sulphuric acid,

and stir the mixture. Put the skins, having soaked and fleshed them, into the liquid, and handle them from one to three hours, according to the thickness, then rinse and hang out to dry in the shade. When nearly dry stuff them with a compound of flour paste and tallow, equal parts, in which a mixture of $\frac{2}{3}$ part fish oil and $\frac{1}{3}$ part of spirits of wine have been added.

General Formula for Tanning or Currying Fur Skins:—

Method of Preparation.—Flesh the skins in the usual way, and soak them in warm water for two hours, then mix equal parts of

Borax,
Nitrate of potash,
Sulphate of soda,

in the proportion of 1 oz. of each for three skins. Make this into a paste with a little water, and spread it on the flesh side of the skin. Fold the flesh side in, and put aside in a cool place. In twenty-four hours wash the skin clean, and apply the following mixture in the same way as before:—

1 oz. crystallised carbonate of soda.
$\frac{1}{3}$ oz. borax.
2 oz. curd soap.

Melt together without being allowed to boil, and fold together and set aside in a warm place for twenty-four hours.

Lastly dissolve

3 oz. alum,
7 oz. salt,
1½ oz. cream of tartar,

in hot water to saturate the skins, and when blood-warm put the skins in it and allow them twelve hours to soak, then wring out and hang up to dry. When dry repeat the soaking and drying two or three times until the skin is sufficiently soft. Lastly, smooth the flesh side with pumice stone or glass paper.

Indian Native Tan for Buckskin :—

Method of Preparation.—Flesh the skin with a dull knife, spread the skin on a smooth log, and grain it by scraping with a sharp instrument. Rub nearly dry over the oval end of a board held upright. Take the brains of a deer or calf, dry by the fire gently, put them into a cloth, and boil until soft. Cool off the liquid until blood-warm with water sufficient to soak the skin in, and soak until quite soft and pliable, and then wring out as dry as possible, wash in strong soap suds, and rub dry and smoke well with wood smoke. Oil or lard may be used instead of brains, and the skin steeped therein twenty-four hours.

Preservative Compound for Furs and Skins :—

Mix together in the powder state :—

Ingredients (No. 1).—1 lb. yellow soap.
1 oz. lime.
1 oz. camphor.
1 oz. white arsenic.
1 oz. alum.

Method of Use.—Remove all flesh, etc., from the skin, and then well rub the above compound in the flesh. Do not allow the mixture to get in any cuts in the hands as the arsenic is deadly poisonous.

No. 2.—Reduce to a powder and well rub into the flesh side :—

2 drachms sulphur (sublimed).
½ oz. black pepper.
½ oz. camphor.
½ oz. bichloride of mercury.
½ oz. burnt alum.

No. 3.—Mix together—

1 oz. bichloride of mercury.
3 drachms hydrochloric acid.
2 oz. methylated spirits.

Method of Use.—For use put sufficient of the mixture into a suitable porcelain vessel, and apply freely over the flesh side with a brush.

Moth Destroyer—Paper :—

Method of Preparation.—Dissolve camphor in turpentine, equal weights of each, steep blotting-paper in the mixture allow it to dry, and then lay the camphor paper amongst the furs it is desired to protect from moths.

Moth Destroyer—Powder :—

Mix together and sprinkle on the furs :—

Ingredients.—1 drachm lupuline (*i.e.*, flour of hops).
2 oz. snuff.
1 oz. camphor.
4 oz. cedar sawdust.

Moth Destroyer—Liquid :—

Use the following fluid either as a spray, or else saturate blotting-paper with it, and lay same amongst the furs :—

Ingredients.—1 oz. carbolic acid.
1 oz. camphor.
1 pint methylated spirits.

A Moth Destroying Powder for Sachets :—

Break up and mix :—

Ingredients.—100 parts patchouli root.
50 parts valerian.
40 parts camphor.
50 parts orris root.
50 parts sumbul.
1 part oil of patchouli.
1 part otto of roses.

Method of Preparation.—Mix the oils with orris root powdered, and then mix all together.

Liquids for Destroying Moths :—

Ingredients (*a*).—2 parts oil of cassia.
2 parts oil of bergamot.
5 parts camphor.
20 parts ether.

Dissolve together and then mix the fluid with—
20 parts carbonate of ammonia.
20 parts orris root.

Ingredients (*b*).—500 parts methylated spirits.
10 parts naphthalene.
10 parts carbolic acid.
5 parts camphor.
5 parts essence of lemon.
2 parts oil of thyme.
2 parts oil of lavender.
2 parts oil of savine.

Method of Use.—Use a spray distributor.

CHAPTER VII.

CHROME TANNING.

WITHOUT doubt, chrome tanning is one of the most important processes of leather manufacture, and during the last ten or fifteen years great strides have been made in this particular branch of tanning. Roughly speaking there are two methods by which hides or skins may be chrome tanned :—

(1) The single-bath process and
(2) The two-bath process ;

but before going into the details of actual tanning it is first necessary to consider for a while the preparation of the liquors necessary for each method.

Single-Bath Liquors.—There are a number of prepared single-bath chrome liquors on the market which only require diluting previous to use, and these are eagerly sought after by tanners owing to the trouble, etc., saved by using such ready-made materials. At the same time there are many leather manufacturers who still prefer to make their own. A single-bath liquor is essentially a basic chrome chloride or sulphate solution, usually the latter, and in almost all cases the chrome salt present has an approximate formula of

$$Cr(OH)SO_4,$$

which salt has been shown by many investigators to be that best suited for chrome tanning. Such a liquor can be prepared by the tanner by two methods, either by the addition of washing soda to chrome alum or by the reduction of a solution of chromic acid made by the interaction of a bichromate and a mineral acid.

Chrome Alum Liquor (for 100 lb. of pelt):—

Ingredients.—10 lb. chrome alum.
2¾ lb. soda crystals.
10 gallons water.

The chrome alum is dissolved in 4-5 gallons of water, stirring well to aid solution. The soda is also dissolved in a separate quantity of water. This latter solution is poured slowly into the chrome alum solution with constant stirring and the liquor made up to 10 gallons with water. A pound or so of salt can be added if desired, as this tends to give a fuller and softer leather.

Another formula is as follows:—

Ingredients.—10 lb. chrome alum.
$1\frac{1}{16}$ lb. soda ash.
10 gallons water.

This is made up in exactly the same manner as the preceding one.

Procter's Glucose Liquor (per 100 lb. pelt):—

Ingredients.—3 lb. sodium bichromate.
6 lb. hydrochloric acid.
3-3½ lb. glucose.
10 gallons water.

The bichromate is dissolved in 2 gallons of water and the acid added. When a clear solution is obtained, the glucose is added in small quantities at a time until the liquor, which is at first of a reddish-yellow colour, turns from an olive-green to a pure bright green colour; this will indicate that the reduction of the chromic acid is complete. The colour is then made up with the rest of the 10 gallons water. This liquor also contains aldehydes, which assist somewhat in the tanning and no doubt a slight aldehyde tannage also takes place.

Instead of using hydrochloric acid, sulphuric may be used, thus

3 lb. sodium bichromate.
2½ lb. sulphuric acid.
3-3½ lb. glucose.
10 gallons water.

Special care should be taken when adding the sulphuric acid to the bichromate solution, as spirting is likely to take place, otherwise the liquor is made up similar to that when hydrochloric acid is used.

In place of glucose many other easily oxidisable organic substances may be used, such as cane sugar, starch, dextrin, etc., and in this direction, a German Patent by Kauschke is not without interest. He suggests using tannery wastes such as leather scraps, horn, hair, and chrome leather shavings for reducing. As an example, the following is given: 400 kilos of chrome leather shavings are mixed with 660 kilos of hydrochloric acid. To this is then added 300 kilos of sodium bichromate. To complete the reduction, 2-3 kilos of potato starch made into an emulsion is added. (Note 1 kilo = 2⅕ lb. approx.)

More recently the use of sawdust and other cellulose waste materials has been patented by Blanc and others.

Various chemical reducing agents may also be used, and among these may be mentioned, sodium thiosulphate, sodium bisulphite, sulphur dioxide, etc.

Using hypo (sodium thiosulphate) the following quantities will be found convenient:—

3 lb. soda bichromate.
3⅓ lb. hypo.
3⅓ lb. vitriol (B.O.V. 80 per cent.).
10 gallons water.

The bichromate is dissolved in a convenient quantity of water, say 2 gallons, and the B.O.V. poured in slowly. The mixture is well stirred and the hypo added in small quantities at a time. It is important to keep the liquor constantly agitated during this addition in order to get a uniform reduction. The liquor will then appear a pure green colour. Should it have an olive tint a little more hypo will be required.

In preparing a single-bath liquor by reducing with sulphur dioxide, as has been recently proposed by various chemists, the bichromate is dissolved in water and sulphur dioxide gas passed through until the solution assumes the well-known green colour of a chrome liquor.

In preparing a single-bath liquor by reducing with sulphur dioxide, all that is necessary is to pass the gas through a solution of the bichromate until the colour is turned to a good greenish-blue. This method was recommended quite recently by Procter at some lectures given in London.

Two-bath Chrome Liquors :—

In this method, two liquors are required, the chromic acid liquor and the reducing liquor. As examples of the chromic acid bath the following may be quoted :—

5 lb. soda bichromate.
5 lb. salt.
3 lb. hydrochloric acid.
Water, convenient quantity.

The above quantities suffice for about 100 lb. pelt. Instead of hydrochloric acid, sulphuric acid may be used as below :—

5 lb. soda bichromate.
5 lb. salt.
1¾ lb. sulphuric acid.
Water, convenient quantity.

The reducing bath may be made up as follows :—

10-12 lb. hypo.
4 lb. hydrochloric acid.
25 gallons water.

Or

5 lb. sodium bisulphite.
12 gallons water.

Methods of Chrome Tanning :—

Single Bath.—For sole leather the hides are suspended in the chrome liquor in pits. The liquor, which at the commencement of tanning is very weak, is gradually strengthened by the addition of concentrated chrome liquor as tannage proceeds. Light skins may be tanned in the paddle or drum. It will not serve much purpose if definite lines are laid down on which to work, as each manufacturer establishes his own particular method of working.

Double Bath.—Here again the suspension method is used for the heavy class of hides, while for light skins the paddle or drum can be used. The goods enter the first bath and are suspended or drummed as the case may be until they are struck through an even yellow colour. They remain in the liquor for a still further short period when they are removed and left in pile to drain overnight. The next day they enter the second bath where they remain (or are drummed) until reduction is complete and the leather is of an even bluish colour. The actual tanning process is then complete, but as the goods are still in an acid condition, they have to be washed and then neutralised in a bath of a weak alkali such as borax, bicarbonate of soda, etc. From this point subsequent operations differ widely according to the class of leather being made.

Stuffing Compounds :—

For chrome sole leather.

Ingredients (No. 1.)—40 parts rosin.
25 parts paraffin wax.
3 parts tallow.
1 part carnauba wax.

The paraffin wax, tallow, and carnauba wax are melted together and the powdered resin added. The whole is well mixed and heating continued until the mixture is clear and free from undissolved resin particles. It is advisable to keep the mixture well stirred during the process of dissolving. The following mixture has also been used :—

Ingredients (No. 2).—50 parts rosin.
45 parts paraffin wax.
5 parts stearine.

Ingredients (No. 3).—25 parts paraffin wax.
20 parts resin.
5 parts tallow.
20 parts Japan wax.

A question which has recently aroused the attention of tanners is the utilisation of the waste chrome liquors.

The single-bath liquors can be treated as follows: The liquors are heated to the boil with steam and a quantity of caustic soda lye added sufficient to precipitate the whole of the chromium. The liquor is allowed to settle and the clear supernatent layer syphoned off. The precipitated chromium hydrate is then filtered. This may be used in either of two ways. It can be dried and heated and sold to colour manufacturers who use large quantities of chromic oxide as a pigment, or it may, after filtering, be dissolved in sulphuric or hydrochloric acid, and the resultant liquor when "saturated" with the chromium oxide be adjusted to the needs of chrome tanning. This latter method would need the supervision of a chemist.

When dealing with the waste first bath liquors of the two-bath process, they will need a somewhat more lengthy treatment. In the first instance the chromium must first be reduced by the addition of sufficient sodium bisulphite or sodium thiosulphate (hypo) to turn the solution green. The chromium can then be precipitated and treated as with single-bath liquors. Needless to say such liquors as chrome liquors should be previously examined by a chemist so that only the minimum quantities of chemicals be used in the recovery of the chromium. More often than not, the works chemist usually examines these first bath liquors and readjusts them for subsequent packs of goods, so that it is very rare that the recovery of the chrome from these liquors comes up for consideration.

CHAPTER VIII.

USEFUL RECIPES AND METHODS.

Wax Polish for Russet Shoe Leathers:—

Ingredients.—1 lb. yellow wax.
2 oz. pearl ash.
1 oz. yellow soap.
48 fluid oz. water.
32 fluid oz. turpentine.
16 grains phosphine dissolved in
2 oz. alcohol.

Method of Preparation.—Mix the wax, soap, pearl ash, and water together by boiling them until a homogeneous cream is obtained, then remove from the fire, and add the turpentine, and lastly the phosphine tincture. Stir well to thoroughly incorporate, and then make up to five pints with water.

Staining Rein and Bridle Leathers:—

Saffron Stain (No. 1).

Boil 2 oz. of saffron in
120 fluid oz. water

for fifteen minutes, and strain. Shade this into suitable tones by mixing it with Spanish annatto.

Saffron Stain (No. 2).

Ingredients.—1 oz. saffron.
$\frac{1}{4}$ oz. cochineal.
1 gallon water.

Method of Preparation.—Boil all together for twenty minutes and then strain.

An annatto stain is prepared by slicing up 16 oz. of Spanish annatto and boiling it until dissolved in 1 gallon of water, then straining and adding a little salts of tartar.

Phosphine Stain :—

Method of Preparation.—Heat 1 oz. of phosphine in 1 gallon of water for ten minutes, and add 2 oz. of lump sugar and strain. This stain may be shaded off with Bismarck brown.

For a green stain boil 1 lb. of turmeric powder in ½ gallon of water for fifteen minutes, and then add 12 oz. of indigo-blue paste, and stir well.

Renovator for Patent and Enamelled Leathers :—

Method of Preparation.—Boil together

8 oz. treacle or sugar.
1 lb. gum-arabic.
2 lb ivory-black.
Water, q. s.

Another Polish for Patent Leather :—

Method of Preparation.—Dissolve 8 oz. of gum-arabic in 20 fluid oz. of water. Mix in 2 oz. of treacle, ¼ oz. of lamp-black, grind up in 1 oz. olive oil, and then add 1 oz. of vinegar, and 2 oz. methylated spirits. Shake until homogeneous.

Russia Odour.—The peculiar odour of Russia leather was for a long time jealously guarded as a great secret. It is due to the impregnation of birch tar oil in the leather, but by the usual method of using this oil the odour has a tarry smell. By means of the following method, however, the delicate odour of refined birch tar oil is obtained.

Method of Preparation.—Dissolve about 4 oz. of caustic soda in 1 pint of 95 per cent. alcohol, and stir this into 25 gallons of water. After treating the leather to the birch tar oil in the usual way, dip it into the above soda bath, when the oil will lose its acrid or tarry smell.

Black Wax :—

Boil together slowly :—

1 gallon pure tar.
4 lb. refined beeswax.
4 lb. mutton tallow.
2 lb. resin.
1½ lb. lamp-black.

When homogeneous and cool mould into cakes.

Curriers' Stuffing for Satin Hide :—

Ingredients.—90 lb. wool grease.
20 lb. English cod oil.
115 lb. lard grease.

Method of Preparation.—Mix together by heating and stirring. The above is for 500 lb. weight of damp leather, and the stuffing is effected thus: Heat the grease to 125° F., and the stuffing wheel to 130° F. Put the grease in the wheel first, and then put the leather in, and run for thirty-five minutes, then take out and set in the usual way.

Seasoning and Blacking for Satin Hide :—

Method of Preparation.—Put 2 parts of logwood chips and 7 lb. of soda crystals (common washing soda) in a barrel of water, boil and cool and give the leather one or two applications. Then produce a black on the seasoned leather by mixing 12 lb. of sulphate of iron and 1½ pints of sumach well boiled and left to settle. After blacking hang up to dry.

A Paste for Satin Hides is made thus :—

Ingredients.—8 lb. flour.
½ lb. gelatine.
½ lb. beeswax.
½ lb. tallow.
1 lb. soap.
1 quart lamp-black.
2 quarts strong logwood liquor (without soda).
2 quarts thick flax seed mucilage.
Water to make 8 gallons.

Method of Preparation.—Mix flour and water until perfectly smooth, and then add the other ingredients, boiling one half-hour, stirring frequently while boiling.

Finish for Satin Hide :—

Method of Preparation.—When dry roll them in paste again, and give them a coat of the following mixture :—

9 lb. blood albumen dissolved in
6 gallons water.

Four gallons of flax seed solution are made from 4 lb. of seed by boiling the seed in 4 gallons of water for five or ten minutes and straining. Discard the seed, and use the remaining mixture. Boil 1 lb. of Irish moss in three gallons of water for fifteen minutes, strain, and use liquid in mixture ; 12 gallons of strong logwood liquor, 5 oz. bichromate of potash dissolved in 2 quarts of water, a solution of gum-tragacanth, making 24 gallons of the whole mixture. Mix well, strain and add 2 quarts of liquid ammonia, when the mixture is ready for use. The above will make about 50 gallons. After giving a coat of the mixture, hang and let dry thoroughly, roll, and they are finished.

Stuffing for Dongola Leather.—For every 100 lb. of leather take—

10 lb. American wool grease.
5 lb. tallow, and
5 lb. cod oil.

Method of Preparation.—Heat the stuffing wheel to 110° F., and the stuffing to 120° F. ; run for half an hour.

Seasoning for Dongola Leather :—

Method of Preparation.—Put 3 parts of logwood chips in a coarse bag, and suspend it in a 50 gallon barrel about half full of water, add 6 lb. sal soda, and boil with steam for two hours. Condensed steam will nearly fill the barrel. If not full add water, then add 1½ pints of liquid ammonia, and use while warm (140° F.). Apply with a medium stiff brush, then wash with cold water, and slick off.

Blacking for Dongola Leather:—

Ingredients.—	23	lb. sulphate of iron.
	7	lb. sulphate of copper.
	3½	lb. sal ammonia.
	50	gallons water.

Method of Use.—Give alternate coatings of a logwood seasoning, and then this black; finally, after slicking, give a slight smear of cod oil. Hang up to harden a little, then slick them firmly on flesh, and hang up to dry. When dry stake them by machine until soft. Then give them a coat of the following compound:—

1	lb. beeswax.
1	lb. lard.
4	lb. paraffin oil.

Melt together, use this warm (110° F.). When this mixture has struck in, wipe them with a soft cloth, and roll in machine, then give them a coat of flax seed, hang up and dry, then roll them and they are finished.

Seasoning Blacks for Levant Goat:—

Method of Use.—The logwood liquor is prepared by boiling 1 cwt. of logwood chips with a little soda in sufficient water to produce a purple colour. This liquor is well brushed into the skins until they assume a dark purple colour. Then lay on the black, which is prepared from 3 quarts of stale malt liquor, 3 quarts of water, 6 oz. of sulphate of iron, and 1 oz. of sulphate of copper. After applying this hang up in a hot stove, dry out, draw through a tray of cold water, allow them to get firm, wet grain same as colours, dry out, and fluff on fine emery wheel.

The Seasoning for Levant Goat is prepared from

3 quarts logwood.
3 quarts water.
10 fluid oz. bullock's blood.
10 fluid oz. milk.
2½ fluid oz. liquid ammonia.
5 fluid oz. orchil.

Method of Use.—This is well brushed into the grain, when the skins are hung up to dry in a warm stove till fit for glazing. After glazing, oil off with linseed or half linseed and mineral oils.

Paste for Wax Calf and Splits:—

Method of Preparation.—Beat up 6 quarts of flour into 2 gallons of water, add 5 lb. mutton tallow, 6 oz. beeswax, 6 oz. dry resin. Add these materials to 6 gallons of water, stirring in 1 lb. of glue in solution. Boil gently for fifteen minutes, and put in 12 oz. of finely sliced Castile soap, taking care that the boiling is not stopped before the introduction of the soap. When cool apply in the usual way. As a finish for the above use ¼ oz. of above paste and ¾ oz. gum dragon of the consistency of heavy cream.

Preparation of Blood Albumen.—Cut up the coagulated blood into cubes of about 1 inch size, and allow them to drain on sieves for forty to forty-eight hours, and after the clear fluid is separated from the red sediment, draw off this clear sediment into wooden vats. This serum is then used for the preparation of *natural* and *patent* albumen; the first has no gloss, and the latter has a gloss.

To make Natural Albumen.

Method of Preparation.—Mix 1 part of turpentine with 10 parts of serum, and agitate them for one hour in a suitable churning or whisking machine. The action of the turpentine is to bleach the serum, and also to withdraw mucous fat from the serum and act as a preservative. Then allow the mixture to stand undisturbed for from twenty-four to thirty-six hours, and draw off the clear serum from the sediment; then dry the serum in iron cups coated with oil paint and lacquer burnt in. These cups should be about 12 inches long, 6 inches wide, and ¾ inch deep. The temperature of the drying room should be about 122° F., and be gradually raised for two hours to 125° F. to 130° F. It is then lowered to 100° F. to 105° F., and kept there for thirty-four hours, when the drying is finished.

To Prepare Patent Albumen.—Mix together

5000 parts serum.
12 parts sulphuric acid.
22 parts concentrated acetic acid.
336 parts water,

and to the mixture add ¼ part of turpentine, and agitate for one hour, then give twenty-four to thirty-six hours' rest, when the clear serum should be drawn off, neutralised with ammonia, and dried as above.

Caseine is a product that is being extensively used in the preparation of a finishing gloss for aniline-dyed skins, etc.

To Prepare Caseine from Milk proceed as follows: Skim some fresh milk so that not a trace of cream remains, then allow it to curdle by letting it stand in a warm place, then collect the curdled milk on a filter paper, and wash the caseine by pouring soft water on it until the latter shows no trace of free acid. To remove the last traces of free acid tie the caseine in a cloth, and boil it in water, then spread it out upon clean, new blotting-paper, and let it dry gradually in a warm place, when it will shrink up to a horn-like mass. Caseine thus prepared can be kept an indefinite time.

Soap.—To prepare soap it is necessary to have caustic soda when hard soap is required, and caustic potash when soft soap is required. The method of soft soap making is as follows: 20 lb. of cotton-seed oil are put into a steam-jacketed pan and heated up to 80-90° C. Four lb. of caustic potash are next dissolved in about ¾-1 gallon water, and this lye added to the heated oil with constant stirring. Saponification is allowed to take place, and after an hour or so a little of the mixture is taken, diluted down with water and examined for any fat globules. If none are present the process of soap formation is complete. The soap stock is then diluted with a further 1½ gallons of hot water and allowed to cool. This will give a good soft soap. In the case of hard soap, 2¾ lb. of caustic soda will be required for each 20 lb. of cotton-seed oil, and the soda should be dissolved in only ½ gallon of water and the resultant stock diluted with a further ½ gallon of water.

Soap can also be prepared from deglycerinated oil, *i.e.*, fatty acids. In this case the reaction between the fatty acid and alkali is more rapid, and the quantity of alkali required differs slightly from that required with ordinary oil, and can be best ascertained from its predetermined "acidity" made by a chemist.

Fat Liquors (soap-oil mixtures).—A general method for the preparation of (soap-oil) fat liquors is as follows: The soap and alkali, if necessary, are dissolved in hot water using for preference a steam-heated pan in which is fixed a mechanical agitator. The oil is then slowly added and the whole continually mixed until a thorough emulsion has been formed. The mixture is then further diluted with the necessary amount of water. A good emulsion should stand diluting without any visible separation of oil after a period of 8-10 hours.

Some typical formulæ for fat liquors are given on next page.

For Chrome Calf:—

Ingredients (No. 1).—6 lb. neatsfoot oil.
2 lb. soft soap.
10-12 gallons water.
5 lb. sulphonated oil.

The sulphonated oil should be added some time after a good emulsion has been obtained and when the mixture has cooled somewhat. A further emulsification is then given.

For Chrome Sheep:—

Ingredients (No. 2).—¾ lb. neatsfoot oil.
1 lb. egg yolk.
2 oz. borax.
1 lb. good soft soap.
12 gallons water.

The soft soap and borax is dissolved as usual. The oil is added, and stirring continued until a good emulsion is formed. When cooled, the egg yolk diluted with a little warm water is then added and the whole stirred.

Another formula is

Ingredients (No. 3).—1 lb. olive oil soft soap.
½ lb. neatsfoot oil.
1½ lb. egg yolk.

Chrome Kid (bright finish):—

Ingredients (No. 4).—2 lb. Marseilles soap.
2 lb. castor oil.
1 lb. olive oil.
¼ lb. Irish moss mucilage.

(Dull finish):—

2½ lb. Marseilles soap.
2 lb. castor oil.
1½ lb. degras.
¼ lb. Irish moss mucilage.

The Irish moss mucilage is added after the soap has been got into solution and a partial emulsion has been obtained.

Vegetable Tanned Calf:—

Ingredients (No. 5).—4 lb. soft soap.
1 lb. soda crystals.
6½ lb. cod oil.
7-8 lb. degras.

This quantity will suffice for above 250 lb. leather.

Sheep Leather:—

Ingredients (No. 6).—8 lb. soft soap.
3½ lb. neatsfoot oil.
2 oz. borax.
4 lb. egg yolk.

Here again the egg yolk is added after the emulsion has been made and the mixture allowed to cool.

In addition to the soap and oil mixtures, soluble or sulphonated oils are used for fat-liquoring purposes, either alone or in conjunction with a vegetable oil (see above). The sulphonation of oil may be carried out by the leather dresser himself provided the method is worked as it should be, and special care taken as regards temperatures. The following method of sulphonating castor oil will be found useful for those who desire to make their own supply:—

50 lb. castor oil.
7 lb. vitriol.

The castor oil is put into a wooden vat and the vitriol slowly and cautiously added. It is most important that the mixture should be thoroughly and constantly stirred. At no period of the operation should the temperature be allowed to rise much above 15° to 16° C. Sulphonation is allowed to take place for about twenty-four hours during which time the mixture should be frequently stirred. It is now necessary to wash the oil with salt solution so as to eliminate the free acid left over. To do this the oil is washed with a saturated brine two or three times. The oil forms a distinct top layer when allowed to stand. The bottom layer of brine can be syphoned off and the residual oil treated a second and third time if necessary. To make sure the oil is neutral it is neutralised by adding ammonia (made by diluting 880 ammonia with four times its volume of water). The weak ammonia is added a little at a time, and, after well stirring, the mixture tested for acid by a strip of blue litmus paper. As long as any acid remains, the blue litmus paper will turn red. This soluble oil when greatly diluted will give a clear solution in which no free fatty particles will be seen.

Other oils may be sulphonated by a process similar to that described above, but, as a rule, the resultant oil does not give a clear solution, when diluted, as does sulphonated castor oil.

Mineral oils are rendered "soluble" in water by a treatment with sulphuric acid, but the process or processes used have not been made known, consequently no details can be given.

Artificial Degras.—An artificial degras may be made up from one of the following formulæ :—

Ingredients (No. 1).—60 parts oxidised fish oil.
10 parts wool grease.
30 parts water.

Ingredients (No. 2).—60 parts oxidised fish oil.
5 parts bone oil.
10 parts wool grease.
25 parts water.

Ingredients (No. 3).—30 parts oxidised fish oil.
20 parts ordinary fish oil.
20 parts wool grease.
20 parts water.

The wool grease and oil are heated in a steam-jacketed pan fitted with a mechanical stirrer. The other fatty ingredients are then added, and the whole well stirred.

Recovery of Grease from Whitenings, etc.—The whitenings, leather cuttings, etc., are put into a convenient sized vessel, and enough water added to cover the contents. The mass is then heated up by means of steam and, when boiling, the steaming continued for a further half an hour or so. The mass is allowed to get cold over a period of a day or so in order that the grease, which rises to the surface of the liquor, may set firmly. The grease is then taken off the surface and transferred to another vessel. A convenient quantity of water is added to this recovered fat, and the whole heated up by means of steam. This second boiling is to purify the grease to a certain extent. It is allowed to cool and the fat, when set, collected and stored for use.

If necessary, a little vitriol, previously diluted with water, can be added to the leather waste before being steamed. This facilitates to a certain degree the separation of the fatty matter.

Bleaching of Dark Fats.—Dark fats, such as recovered grease obtained by the method outlined above, can be made lighter in colour by bleaching with chromic acid. By this method the impurities in the fat are oxidised; while the quantity of bichromate and acid used is regulated there is very little loss due to oxidation of the actual fatty matter. For every 100 lb. of recovered grease weigh out 20 oz. of bi-chromate of soda and dissolve it in the smallest possible quantity of water. This solution is then mixed thoroughly into the melted fat (50° C.). Then add to this mixture 2 lb. of spirits of salt per 100 lb. fat. Stir well for a few minutes and allow to settle. The bleached fat is then freed from any acid by washing with hot water and allowing to solidify.

Waterproofing Sole Leather.—The mixture given below is applied to the soles of boots or, in the case of ordinary sole leather, this may be dipped or applied with a brush.

Ingredients (No. 6).—2½ lb. paraffin wax.
1 quart linseed oil.
½ pint turpentine.

The paraffin wax and linseed oil are heated together and the turpentine added.

Seasonings.—A good season for black glazed chrome sheep can be made up as follows:—

Ingredients (No. 1).—1 oz. hæmatin crystals.
14 oz. blood albumen.
4-6 oz. water soluble nigrosine.
2½-3 gallons water.

The hæmatin crystals and nigrosine are dissolved in about 1 gallon of hot water, and when cold, the blood albumen, previously dissolved in a separate quantity of cold water, added. The whole is then made up to approximately 2½-3 gallons with water. The albumen is best got into solution by allowing to stand overnight with about ½ gallon of water. If necessary it may be warmed to about 37° C. to acid solution.

For Coloured Sheep Leather (vegetable tanned):—

Ingredients (No. 2).—4 oz. egg albumen.
2 oz. gelatin.
¼ oz. borax.
3 gallons water.

The borax is dissolved in 1 pint of warm water and the egg albumen dissolved to this solution. When cool, add the gelatin which has been previously dissolved in about 1 pint of warm water. This solution is diluted down to about 3 gallons. If necessary the season may be tinted with a little of the same dye-stuff as has been used in dyeing the goods.

For Willow Calf:—

Ingredients (No. 3).—10 parts tragasol.
3 parts egg albumen.
15 parts milk.
20 parts water.

The albumen is dissolved in a very small quantity of water, taking care not to heat above 37° C. In order to get the tragasol into solution it must be constantly stirred, making small additions only of water each time. A smooth solution must be obtained before any further addition of water is made. It is a somewhat difficult thing to do at first without the aid of a mechanical mixer, but all that is necessary is a little patience and practice. When all the water has been worked into the tragasol so that it is free from any lumps, the albumen solution is added, followed by the milk. The whole is well mixed.

Tragasol is one of the recent additions to the number of finishing materials used in leather dressing, and is a gummy product obtained by a special process from the locust bean seed.

Black Chrome Calf (dull finish) :—

Ingredients (No. 4).—14 oz. neatsfoot oil.
2 oz. beeswax.
4 oz. nigrosine.
¾ lb. ivory soap.
2 oz. gum-tragacanth.
2½ gallons water.

The gum-tragacanth is allowed to soak in 1 pint water for a day and the mucilage gently warmed so as to get the whole into solution. The oil, soap, and beeswax are boiled together in ½ gallon of water, and the tragacanth solution added. After adding the nigrosine, previously dissolved in hot water, the liquor is made up to 2½ gallons, and well stirred. The whole is boiled for ten minutes or so and allowed to get cold, stirring as often as possible.

Black Chrome, Goat Finish :—

Ingredients (No. 5).—10-14 oz. blood albumen.
¼ lb. water-soluble nigrosine.
1 oz. hæmatin crystals.
2 gallons water.

The albumen is soaked in water overnight and, if necessary, slightly warmed to obtain a good solution (37 C.). The nigrosine and hæmatin are dissolved in 1 gallon of water, cooled, the albumen solution added, and the whole made up to 2 gallons.

Coloured Chrome Kid:—

Ingredients (No. 6).—3 oz. egg albumen.
1½ oz. good quality shellac.
2 oz. methylated spirit.
½ oz. borax.
2 gallons water.

The albumen is dissolved in water by allowing to stand overnight with 1 pint water, warming slightly, if necessary, with the usual precautions. The shellac is dissolved in ½ pint of boiling water with the addition of the borax. When cold, these two solutions are mixed, and the spirit is added. The whole is diluted down to 2 gallons and tinted with a little of the dye-stuff used in dyeing. The addition of 1-2 oz. of glycerine could be made with advantage.

Wax Finish for Russet Calf:—

Ingredients (No. 7).—2½ gallons soft water.
2 lb. Marsailles soap.
1 lb. melted neutral tallow.
1 lb. good fish oil.
½ lb. yellow wax.

Dissolve the soap in boiling water and add the other fatty ingredients. Boil well and stir continuously during cooling. This is applied to the flesh side in a light coat.

Glue Glaze for Black Leather Goods:—

Ingredients (No. 8).—2 oz. glue.
2 oz. soap.
½ oz. yellow wax.

The glue and soap are dissolved separately, each in ¾ pint water. When dissolved they are mixed and the wax added. The whole is then boiled, well stirred, and allowed to cool.

Finish for Legging Leathers :—

Ingredients (No. 9).—2½ oz. primrose soap.
4½ oz. beeswax.
4½ oz. gelatine.
10½ oz. starch.

The soap and gelatine are dissolved in water, the beeswax added, together with the starch, previously made up into a thin paste with water. Six oz. of glycerine should then be added. This will make 5 quarts.

INDEX.

Acids in dyeing, 89.
Alum tanning, 91, 92.
Aniline colours, uses of, 105.

Bag leathers, compound for, 14.
Ball black, 41.
Basic colours, 107.
— sulphate of iron liquor, 69.
Belt leather, compound for, 14.
Belts, military, whitening of, 32.
Benzene, 128.
Bichromate of soda, 136.
Birch tar oil, 130.
Black finishes, 69, 70, 71.
— harness, dye for, 38.
— — edge stain for, 126.
— — lacquer for, 33.
— — oil for, 36.
— — polish for, 35.
— — renovator, 42.
— kid reviver, 123.
— lacquers, 115, 116, 117.
— liquor, 69.
— wax, 144.
Blacking compound, 66.
Bleaching compound, 61.
Blood albumen, to make, 147.
Boot blackings, 1.
— grease, waterproof, 31.
— top liquids, 30.
— — powder, flesh-coloured, 29.
— — — for coachmen, 29.
— — — nut-brown, 30.
Bosh, 49.
Bottom size, curriers , 77.
— washes, 47.
Brazilwood, 103.
Breeches, buff, renovator for, 32.
— whitening of, 32.
Bronze coloured lacquer, 117.
— lacquer for, 27.
— — — shoes, 117.
— leather, wax polish for, 27.
Brown boot-top liquid, 31.
— boots and shoes, polishes, etc., for, 21.
— cream, 21.
Brown cream, cheap, 22.
— finishing inks, 54.
— glacé, renovator for, 27.
— patent, waterproof gloss for, 24.
— stain, 58.
— wax polish, 21.
Buckskin, Indian native tan, 132.
Buff finishes for soles, 47.
— riding breeches, renovator for, 32.
Bugh's method for beaver and otter skins, 114.
Burnishing inks, 53, 54.

Calf kid, dressing for, 15.
— — uppers, to renovate, 26.
— leathers, finishing compounds for, 73.
Camwood, 103.
Carriage tops, dressing for, 34.
— — lacquer for, 34.
Caseine, to make, 148.
Cement for bootmakers, 59.
Chamois leather, 93.
Chlorazol colours, 108.
Chrome after vegetable tanning, 99.
— alum liquor, 136.
— leather dyeing, 109.
— tanning, method of, 139.
— — single bath, 135.
Coachman's boot top powder, 29.
Coal-tar colours, uses of, 105.
— — — dissolving of, 108.
— — — dyeing with, 108.
Cobblers' wax, 51.
Cochineal, 103.
Common boot blackings, 2.
Cream finish for soles, 49.
Creams, 1.
Crimson purple bronze lacquer, 28.
Crown soap black, 74.
Cudbear, 102.
Curriers' seasons, 62.
Cutch, 103.

Dancing shoes, dressing for, 9.
Danish glove leather, tawing paste for, 84.

Degras, artificial, 152.
Dianol colours, 107.
Direct cotton colours, 107.
Doeskin, to clean, 128.
Dongola leather, blacking for, 146.
— — seasoning for, 145.
— — stuffing of, 145.
Dressing for bright polish, 71.
— for harness, 42.
— good quality, 15.
Dressings, 1, 13.
Drum dyeing, 108.
Drying of dyed skins, 87.
Dubbin, 16, 57.
— for Russia leather, 24.
Dull kid, dressing for, 15.
Dye for black harness, 38.
Dyebaths, 86.
Dyeing alum-tanned skins, 92, 97.
— drums, 89.
— general remarks on, 111.
— leather, 85.

Edge stains, 58.
Egg yolk, substitute for, 83, 84.
— — to preserve, 124.
Elastic varnish, 35.
Emollient compounds for leather, 13.
Enamelled leather, black finish for, 70.
— — white, lacquer for, 34.
— leathers, compound for, 18.
— — preparation of, 79.
Enamelling compound for patent leathers, 80.

Fakes, 49.
Fat liquors, to make, 149, 150, 151.
Fats, bleaching of, 153.
Finishers' inks, 51, 52, 55.
Flesh blacking, 72.
— coloured boot top powder, 29.
Flour paste for splits, 76.
Fluid blacking, 4, 5.
— gloss for glace leathers, 16, 17.
Fur skins, currying of, 131.
— — dyeing of, 113.
— — tanning of, 131.
Furs, preservative for, 132.
— protection of from moth, 124.
— to clean, 127.
Fustic, 102.

Gilding on leather, 125.
Glacé kid leather, a renovator for, 27.
— leathers, gloss for, 11.
Gloss, self-polishing, 12, 13.
Glosses, 1.
— for patent leathers, 18.
Glove cleaner, 128.
— leathers, dyeing of, 94.
— — tanning and dyeing of, 90.
— — tawing compound for, 82.
Glucose liquor, 136.
Glue glaze for black leather, 156.
— paste for skins, 59.
Glycerine polish for leather, 119.
Grease extractor, 128.
— recovery of, 152.
Gutta-percha blacking, 7.

Harness, black, oil for, 36.
— composition, 40, 41.
— dressing, 42.
— — for general use, 43.
— enamelled, self-shining lacquer for, 35.
— grease, 44.
— leather, black finish for, 71.
— — stuffing compound for, 65.
— liquid blacking for, 37.
— oil, cheap, 42.
— — for, 40.
— — — general use, 43.
— paste, superior, 39.
— pastes, 38, 39.
— polish, waterproof, 33.
— vaseline composition for, 43.
Heel balls, 45, 46.
High-class boot leathers, liquid blacking for, 9.

India-rubber varnish, 117.
Indigo, 104.
Inks, 51.
— burnishing, 53.
— staining, 52.
Iron liquor, 68.

Japan for patent kid, 81.

Kips, stuffing compound for, 64.

Lacquer, self-polishing, 13.
— self-shining for enamelled harness, 35.
Lacquers for patent leathers, 18.
Leather and metal, joining of, 123.
— cement, 118, 122.
Legging leathers, finish for, 157.
Levant goats, black, season for, 146, 147.
— ink, 70.
Light leathers, liquid dressing for all, 18.
— skins, curing of, 130.
Limawood, 103.

Liquid blacking for black harness, 37.
— — — harness, 37.
— blackings, 7, 8.
Logwood, 103.
— black, 67.

MATS from sheepskins, 120.
Metal and leather, joining of, 123.
Military boots, whitening of, 32.
Mordanting, 85, 89.
Morocco leather, bronze lacquer for, 27.
Moth destroyers, 133, 134.

NATURAL albumin, 147.
Nut-brown boot-top powder, 30.

OIL finish, 77.
— — for grain side, 74.
— grain leathers, seasoning for, 66.
Oiling off, 77.
One bath alum tanning, 91.
Orange edge stain, 58.
Orchil, 102.

PADDLE dyeing, 108.
Paste blacking, 3, 4, 5, 6.
— for stiffeners, 60.
Pasteboard and leather cement for, 123.
Pasting upper leathers, 75.
Patent albumen, to make, 148.
— kid, 81.
— leather, dressings for, 9.
— — glosses for, 18.
— — polish for, 143.
— — renovator for, 19, 143 (alkaline, 19; paste, 20).
— — reviver for, 19.
— — to renovate, 126.
— — wax polish for, 20.
Peachwood, 103.
Phosphine stain, 143.
Pickling, 91.
Polishes, 1.
Powder for tight boots, 49.

RABBIT skins, black, 116.
Red arsenic, use of, 90.
— edge stain, 58.
Reins, staining of, 142.
Renovators, 1.
Reviver for patent leathers, 19.
Rubber cement, 118.
Russet calf, wax finish for, 156.
— shoe leather, polish for, 142.
Russia leather, dubbin for, 24.
— — dyeing, 129.
— odour, 143.

SABLE skins, to imitate, 124.
Saddening, 110.
Saffron, 102.
— stain, 142.
Salts in dyeing, 89.
Sanderswood, 103.
Satin hides, 144, 145.
Scar paste, 78.
Seasoning for oil grain leather, 66.
Seasonings, 154.
Self-shining blacking, 11, 12.
Sewing machine wax, 56.
— wax, 56.
Sheepskins for mats, 120.
Shellac ink, 56.
Shoe blackings, 1.
Shoemakers' paste, 60.
— waxes, 51.
Sig. liquor, 66.
Single bath chrome liquors, 137.
Size paste, 75.
Skins, preservative for, 132.
Soap black for splits, 75.
— blacking compound, 74.
— to make, 149.
Soft kid, dressing for, 15.
Sole leather, composition for, 61.
— — waterproofing of, 126.
— — white bottom wash for, 127.
Solid blacking compounds, 72.
Solution wax, 50.
Spankum, 49.
Spirit inks, 55.
— renovator for patent leather, 19.
Split leathers, finishing compound for, 73.
Splits, flour paste for, 76.
— stuffing compound for, 64, 76.
Staining, 87, 88, 109.
Stiffeners, paste for, 60.
Strap leather, black finish for, 71.
Stuffing compounds, 63.
— — for chrome leather, 139, 140.
— general remarks on, 65.
Suede shoes, to renovate, 126.
Sulphonated oils, preparation of, 151.
Surface of leather, blacking for restoring the, 11.

TAN paste, 23.
Tanned leather to harden, 125.
Tawing liquor, 96.
Tight boots, powder for, 49.
Toney-red cream, 22.
Top size, curriers', 78.
Tragacanth, gum, mucilage, 76.
Transparent leather, 118.
Tray dyeing, 109.

Treeing boots, renovators for, 31.
— compositions, 25.
Turmeric, 102.
Two bath chrome liquors, 138.

UPPER leathers, finishing compound for. 72.
— — soap black for, 75.

VARNISH for enamelled leathers, 80, 81.
Varnishes for patent leathers, 18.
Vaseline composition for harness, 43.
Vinegar black, 67.
Vinette, 67.

WASH leather to clean, 128.
Waste chrome liquors, uses of, 140.
Waterproof boot grease, 31.
— composition for boots, 119.
— dressing, 16.
— finish for sole leather, 49.
Waterproof gloss for brown patent, 24.
— harness paste, 39.
— — polish, 33.
— liquid harness blacking, 37.
Waterproofing compound, 59.
— sole leather, 153.
Wax calf, paste for, 147.
— finish for sole leather, 49.
— for sewing machine, 56.
— polish for harness, 42.
— — patent leather, 20.
Waxed calf, stuffing compound for, 64.
Waxes for sewing, 56.
— shoemakers, 51.
Weld, 102.
White bottom finish, 127.
— — wash, 127.
— cream, 22.
— enamelled leather, lacquer for, 34.
— wax, 57.
Wool rugs, dressing of, 119.
— skins, dyeing of, 112.
— washing compound, 129.

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